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# Freshwater Algae of Ellesmere Island, N.W.T.

**Hannah Croasdale**



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Sciences naturelles

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# Freshwater Algae of Ellesmere Island, N.W.T.

**(Exclusive of Diatoms and Flagellates)**

Hannah Croasdale

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## Résumé

Le présent ouvrage étudie les algues d'eau douce de l'île Ellesmere qui fait partie de l'archipel polaire du Canada. Les spécimens appartiennent à d'importantes collections prélevées dans la zone de recherche de Camp Hazen, dans la partie nord-est de l'île (81° 49'N, 71° 18' O). Parmi les cyanophycées, les chlorophycées et les chrysophycées (sans compter les diatomées) 225 types sont représentés dont neuf semblent nouveaux à la phycologie. Par ailleurs, tous ces types, à l'exception de cinq d'entre eux, sont pour la première fois identifiés dans l'île Ellesmere. Cette flore semble nettement alpino-boréale et l'on remarque chez les desmidiées deux tendances nordiques: un petit nombre de genres et une distribution relativement abondante du genre *Cosmarium*. On note aussi de façon positive que les cyanophycées sont relativement plus abondantes dans les petits étangs saisonniers alors que les desmidiées se rencontrent plutôt dans les étangs plus vastes et permanents.

Les types que l'on croit nouveaux sont les suivants: *Pediastrum boryanum* (Turp.) Menegh. var. **ellesmerense** var. n., *Actinotaenium diplosporum* (Lund.) Teil. f. **arcticum** f.n., *Cosmarium anceps* Lund. f. **arcticum** f.n., *C. granatum* Bréb. **messikommeri** f.n., *C. punctulatum* Bréb. f. **arcticum** f.n., *C. quadratum* Ralfs f. **boreale** f.n., *C.* **septentrionale** sp. n., *C. subeductum* Gutw. var. **oliveri** var. n. et *Staurastrum scabrum* Bréb. f. **boldtii** f.n.

## Summary

The freshwater algae of Ellesmere Island, N.W.T., Canada, were studied from extensive collections taken from the Camp Hazen Study Area in the northeastern part of the island (81° 49'N, 71° 18'W). In the groups of blue-greens, greens and yellow-greens (exclusive of diatoms), 225 taxa are illustrated, of which all but five are new records for Ellesmere and nine believed new to science. The algal flora seem mainly arctic-alpine and in the desmids show two northern tendencies: a small number of genera and a relatively great abundance of the genus *Cosmarium*. It is also clearly indicated that, in this area, blue-greens are relatively more abundant in small, temporary ponds and desmids in larger, permanent ponds.

Taxa believed new to science are: *Pediastrum boryanum* (Turp.) Menegh. var. **ellesmerense** var. n., *Actinotaenium diplosporum* (Lund.) Teil. f. **arcticum** f. n., *Cosmarium anceps* Lund. f. **arcticum** f. n., *C. granatum* Bréb. f. **messikommeri** f. n., *C. punctulatum* Bréb. f. **arcticum** f. n., *C. quadratum* Ralfs f. **boreale** f. n., *C.* **septentrionale** sp. n., *C. subeductum* Gutw. var. **oliveri** var. n., and *Staurastrum scabrum* Bréb. f. **boldtii** f.n.

## Biographical Note

Dr. Croasdale's interest in algae from the far north began in 1951 when the Arctic Institute of North America sponsored her study of the algae and bryophytes of interior Alaska, with particular reference to their distribution in both glaciated and unglaciated areas. This subarctic region proved to be extremely rich in desmids, which led her to engage in further research on collections from such areas as Cape Thompson and Karluk Lake in Alaska, and Labrador and Devon Island in Canada. The present study was undertaken as the result of a grant from the National Science Foundation, combined with the offer by Dr. D.R. Oliver and Dr. P.S. Corbet, Entomology Research Institute, Department of Agriculture, Ottawa, to make available their Ellesmere Island collections. The material in these collections proved to be subarctic rather than arctic, but rich and interesting enough to occupy Dr. Croasdale's time for four years. Recently retired from active teaching in the Department of Biological Sciences, Dartmouth College, Hanover, N.H., Dr. Croasdale is currently engaged in the study of desmids of North America and the tropics, but would still welcome freshwater collections from a truly arctic habitat.

Ellesmere Island, N.W.T., Canada, is the third largest island of the Canadian Arctic archipelago, with an area of approximately 75,024 square miles, much of the interior being covered by an ice cap. It extends farther north than any land mass except Greenland, to lat. 83°8′ N, less than 500 miles from the North Pole (Map 1, p. 14).

From 1962 to 1965, Dr. D. R. Oliver and Dr. P. S. Corbet of the Entomology Research Institute, Department of Agriculture, Ottawa, made an extensive study of aquatic habitats in the region known as the Hazen Camp Study Area (Map 2, p. 16; Table 1, p. 119) in the northeastern part (81° 49′N, 71° 18′W) of Ellesmere Island (Oliver and Corbet 1966). In the course of their investigations freshwater algae were collected and preserved, 12 collections being made in the summer of 1962 (some by Dr. D. B. O. Savile), and 200 in the summer of 1965 (some by Dr. U. I. Røen), "I think from every possible habitat" (D.R. Oliver 1965: *personal communication*). The present paper treats the blue-greens, greens and some of the yellow-greens of these collections. Diatoms have been omitted, although there is an abundance of them in the collections.

Previous investigations of the freshwater algae of Ellesmere Island are limited to two papers in Polunin's *Botany of the Canadian Eastern Arctic.* Ross (1947) studied the diatoms, finding 192 species in all, 76 of which occurred on Ellesmere Island. Whelden (1947) treated the other algae, reporting 383 species in all, but only five on Ellesmere Island. Accordingly, of the 225 taxa illustrated in the present paper (which omits diatoms), practically all are new records for Ellesmere Island.

The ample statistics furnished in the Oliver and Corbet paper (1966) on the freshwater habitats, and the fact that the collections were taken during practically the whole short growing season, challenged the author to find correlations between physical properties of the habitats and the algal taxa. Although comparison of taxa with surface area, volume and depth of water, and pH was fruitless, there proved to be a very definite relationship between the permanence of a pond and the groups of algae it supported (Graph 1, p. 120); blue-greens were relatively more abundant in temporary ponds and desmids in permanent ponds, including tarns. This curve was definite when diversity only was noted; that is, the number of different taxa from one type of pond was recorded and compared to the number from another type. It was somewhat more striking when the biomass was taken into account and an evaluation made of the number of ponds in which each taxon was found, and the relative abundance of that particular taxon in each.

The extremely high latitude and the extensive glacier coverage of northern Ellesmere Island originally encouraged the hope that a truly arctic flora might appear in the collections, but this did not occur. The overall impression was of an

arctic-alpine flora, with some subarctic and many cosmopolitan forms. Among the most abundant arctic-alpine forms were *Cosmarium pokornyanum* (Grun.) West and West, *C. pseudoholmii* Borge and *C. wittrockii* Lund. The only presumably true "arctic species" was *Staurastrum rhabdophorum* Nordst., found not in the Hazen Camp Study Area but at Craig Harbour, at the southernmost tip of the Island (76° 10'N, Whelden 1947).

It is quite possible that this absence of an arctic flora is attributable to the summer temperatures in the Camp Hazen Study Area, where the collections were made. As Savile (1964: 238) pointed out, summer temperatures there "are generally exceptionally high for the latitude, higher in fact than for many coastal stations 5° to 8° farther south". A four-year record showed a July mean of 44.2°F, which is probably higher than that at Craig Harbour.

In fact, the desmid flora of Ellesmere Island, as known from the Camp Hazen Study Area, is very similar to that of Devon Island (75°40' N) since 44 of the 90 species found on the islands occurred on both. Another similarity exists between the algae of Ellesmere Island and those of northeastern Greenland (76° N, Børgesen 1910). Most of the blue-greens he reported and nearly half of the greens, including desmids, were found also on Ellesmere Island.

However, while not truly arctic, the desmid flora of Ellesmere showed two "high northern tendencies": 1) the decreasing number of desmid genera, and 2) the increasing relative abundance of *Cosmarium*. These tendencies are shown in Graphs 2 and 3 (pp.121,122), where a comparison is made with desmid floras I studied, from Labrador (51° 30' to 55° 30'N), Alaska (66° to 68° N) and Devon Island (75° 40' N). I noted no significant difference for degrees of longitude. The Alaskan desmids fit into the curve as if they also occurred on the east coast of North America.

It is disappointing that the one algae collection known for comparison from a higher latitude — northern Greenland (81° 25' to 83°6', Petersen 1924) — was based on only 12 samples of dried material, and revealed mainly blue-greens and diatoms. The blue-greens agree very closely with those in the Ellesmere collections (there are 10 of the 13 species), but only a very few greens were reported, mostly genus only, and only one desmid, which was cosmopolitan in distribution.

The algae from the Camp Hazen Study Area were collected, principally by Dr. U. Røen and Dr. D. R. Oliver, from about 60 different localities, most of which are described in detail in a recent publication (Oliver and Corbet 1966). For each taxon reported the locality is noted, followed by a letter indicating its relative abundance, i.e. *cc* (very common), *c* (common), *o* (occasional), *r* (rare), *rr* (very rare). This is a subjective rating, based solely on observation of a few slides from each vial; the number of slides made from the

material in each vial varied from one to eight, and the number of vials per locality from one to ten, both averaging about 3.5.

**Taxonomic Part**

The genera are arranged in a natural system, according to the author's best understanding, but the species are alphabetized under each genus. Keys are furnished to the local genera and species. In identification, the authorities used were chiefly Bourrelly (1966), Drouet (1968), Drouet and Daily (1956), Prescott (1951), Geitler (1932), Krieger (1937), Krieger and Gerloff (1962, 1965), the monograph on desmids (West and West 1904 – 12), West, West and Carter (1923), and the author's iconograph.

Relatively few novelties were found (nine), and these expressed mostly varietal or subvarietal deviations, tying together forms that had been seen by the author in Devon Island, Alaska or both. But other "high northern tendencies", repeatedly noted among desmids, were indicated in their variability of size and shape, few being perfectly symmetrical, and in their tendency toward a certain compactness. In the Ellesmere material, wide variability also appeared occasionally in other green algae, notably *Binuclearia tectorum* (Kütz.) Beger, and quite commonly among the blue-greens. For example *Nostoc* and *Anabaena* were very common and extremely variable. At first many species of each were identified tentatively, but the author's final conclusion, confirmed by Dr. Drouet, was that these were all mainly forms of one species each: *Nostoc commune* Vauch. and *Anabaena lapponica* Borge.

Type material of the novelties is deposited in the Phycology Section of the National Herbarium of Canada, National Museum of Natural Sciences, Ottawa. Extensive pond-by-pond statistics of algae present are on file at the Entomology Research Institute of the Department of Agriculture, Ottawa. Material in good condition is also still available in the author's own herbarium for anyone who would like to work up the diatoms.

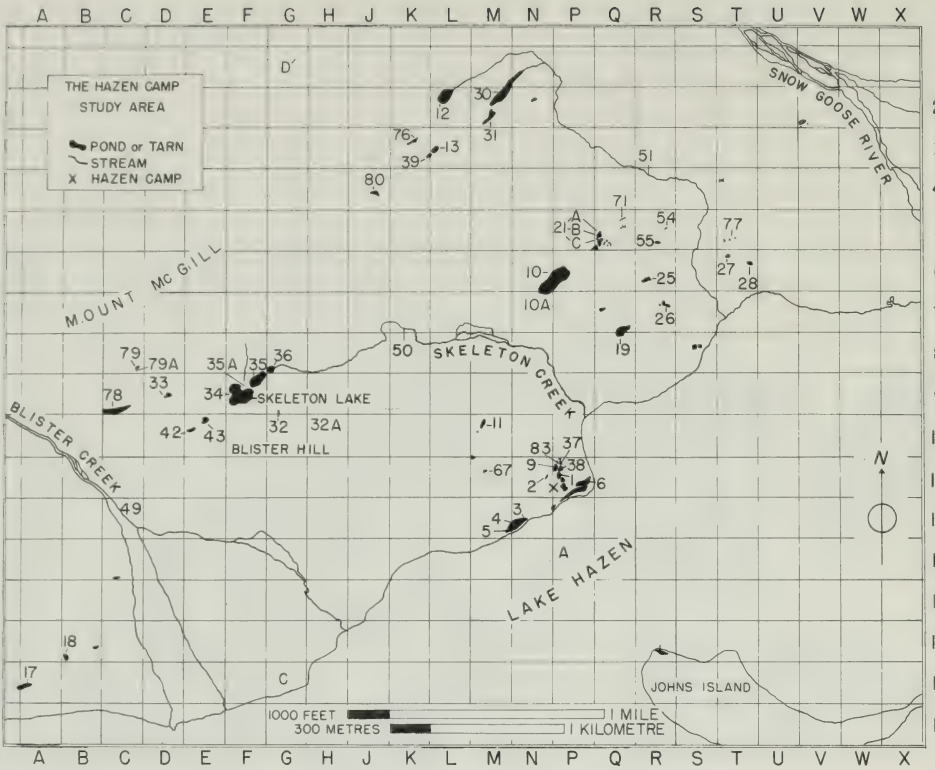
**Acknowledgements**

I am indebted to Dr. D. R. Oliver and Dr. P. S. Corbet of the Entomology Research Institute, Department of Agriculture, Ottawa, for making available to me their collections of freshwater algae from Ellesmere Island. Thanks are also due to Dr. U. Røen and Dr. D.B.O. Savile for their part in the collecting, and to Dr. Francis Drouet, of the Academy of Natural Sciences of Philadelphia, for his help in the identification of some of the blue-greens.

My work was supported by a grant (GB – 1341) from the National Science Foundation, Washington, D.C.


Map 1. Ellesmere Island.

Taxonomy




Map 2. The Hazen Camp Study Area (Oliver and Corbet 1966).

**Key to the genera found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells solitary or in colonies, never in filaments | 2 |
| 1 | Cells in filaments, consisting usually of one or more trichomes enclosed in a sheath | 5 |
| 2 | Cells in spheres or flat plates | 3 |
| 2 | Cells solitary or in irregular colonies | 4 |
| 3 | Cells compactly arranged in a hollow sphere | *Gomphosphaeria*, 24 |
| 3 | Cells rather regularly arranged in plates | *Agmenellum*, 23 |
| 4 | Cells before division longer than broad, dividing in a plane perpendicular to main axis | *Coccochloris*, 18 |
| 4 | Cells before division spherical, dividing in 3 dimensions, often remaining in cuboidal packets | *Anacystis*, 19 |
| 5 | Filaments neither branched nor tapering | 6 |
| 5 | Filaments branched, tapering or both | 11 |
| 6 | Cells rectangular, usually broader than long | 7 |
| 6 | Cells bead-like or barrel-shaped, with occasional heterocysts | 10 |
| 7 | With a layer of granules on each side of cross-walls | *Microcoleus*, 28 |
| 7 | Cross-walls without granules | 8 |
| 8 | Outer wall of end cell thickened, cells very short | *Oscillatoria*, 27 |
| 8 | Outer wall of end cell not thickened, cells about as long as broad | 9 |
| 9 | Filament not tapered | *Schizothrix*, 24 |
| 9 | Filament tapered through several to many cells | *Porphyrosiphon*, 25 |
| 10 | Filaments coiled or contorted in rather firm jelly balls | *Nostoc*, 28 |
| 10 | Filaments straight or slightly curved, not encased in jelly | *Anabaena*, 29 |
| 11 | Filaments branched but not tapering | 12 |
| 11 | Filaments tapering strongly from a basal heterocyst | 13 |
| 12 | Cells longer than broad, branches mainly in pairs | *Scytonema*, 31 |
| 12 | Cells shorter than broad, branches mainly single | *Tolypothrix*, 32 |
| 13 | Filaments many in cluster, usually lime-encrusted | *Rivularia*, 33 |
| 13 | Filaments single or few together, not lime-encrusted | *Calothrix*, 32 |

## Chroococcales

### *COCCOCHLORIS* Sprengel 1827

**Key to the species found on Ellesmere Island**

1 Plants 1-2-celled, 14-32 μ diameter ..... *C. aeruginosa*
1 Plants more than 2-celled, less than 6 μ diameter ..... 2
2 Cells 1-2 μ diameter, 2 to 4 times as long ..... *C. peniocystis*
2 Cells 3-6 μ diameter, 1 to 2 times as long ..... *C. stagnina*

*Coccochloris aeruginosa* Drouet and Daily (including *Synechococcus aeruginosus* Nägeli and *S. major* Schröter)
Plate I, figs. 1-6

Cells (not including sheath) 14-32 μ × 20-52 μ (1.2-2 ×). Cells large, blue-green or olive green, single or in pairs after division; mucilaginous sheath usually thin or absent.

**Habitat**
In tarns, all sizes of ponds and a creek, principally on the bottom and in squeezings from mosses at the edge. June, July, August.

**Stations**
1-r, 4-r, 9-o, 10-cc, 12-o, 13-o, 18-r, 21A-r, 26-c, 28-o, 30-c, 31-r, 33-r, 34-r, 35-r, 35A-r, 36-r, 39-r, 42-cc, 50-r, 55-o, 79-r, 83-r.

*Coccochloris peniocystis* Drouet and Daily (including *Aphanothece saxicola* Näg.)
Plate I, fig. 8

Cells 1.5-2 μ × 5-7 μ (3.3-4.7 ×), loosely and irregularly distributed in irregularly-shaped colonies.

**Habitat**
In squeezings from moss, and on bottom of permanent and semipermanent ponds and a tarn. August.

**Stations**
13-rr, 28-r, 32-cc.

*Coccochloris stagnina* Spreng. (including *Aphanothece stagnina* A. Braun)
Plate I, fig. 7

Cells 3-6 μ × 4.5-8 μ (1.2-2.3 ×), colonies 17-240 μ × 21-300 μ.

**Habitat**
In all situations in tarns, all sizes of ponds and in creeks. July, August.

**Stations**
1-o, 4-r, 9-c, 10-c, 13-rr, 17-rr, 19-o, 21A-r, 27-r, 31-r, 32-r, 33-r, 34-r, 35-o, 36-r, 37-o, 38-r, 39-o, 43-r, 50-cc, 55-r, 76-r, 77-r, 79-c.

## *ANACYSTIS* Meneghini 1837

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells with pseudovacuoles, often in lobed or clathrate colonies | *A. cyanea* |
| 1 | Cells without pseudovacuoles (cell contents granular or homogeneous), in small groups or ± spherical colonies | 2 |
| 2 | Cells more than 6 $\mu$ in diameter | 3 |
| 2 | Cells less than 6 $\mu$ in diameter | 4 |
| 3 | Cells to 31 $\mu$ in diameter, usually remaining angular after division | *A. dimidiata* |
| 3 | Cells to 12 $\mu$ in diameter, soon becoming spherical after division | *A. thermalis* |
| 4 | Cells 3-5 $\mu$ in diameter | *A. montana* |
| 4 | Cells 1-2 $\mu$ in diameter | *A. marina* |

*Anacystis cyanea* Drouet and Daily (including *Microcystis aeruginosa* Kützing and *M. flos-aquae* Kirchner)
Plate I, figs. 9, 10

Cells 2.5-5 $\mu$ in diameter, pseudovacuoles sometimes evident. Cells subspherical, irregularly and closely disposed throughout the mucilage in globose to irregular and clathrate colonies.

**Habitat**
In squeezings from moss, in open water and on bottom of temporary and permanent ponds and a tarn. July, August.

**Stations**
1-r, 9-c, 13-o, 21A-r, 30-r, 31-r, 37-o, 83-r.

*Anacystis dimidiata* Drouet and Daily (including *Chroococcus turgidus* (Kütz.) Näg.)
Plate II, figs. 1-5

Cells 6-31 $\mu$ in diameter, colonies 12-75 $\mu \times$ 20-100 $\mu$. Cells in packets of 2 to 16, truncate-hemispherical, surrounded by a colourless sheath, often slightly lamellate.

**Habitat**
In all situations in tarns and in all sizes of ponds; very common. June, July, August.

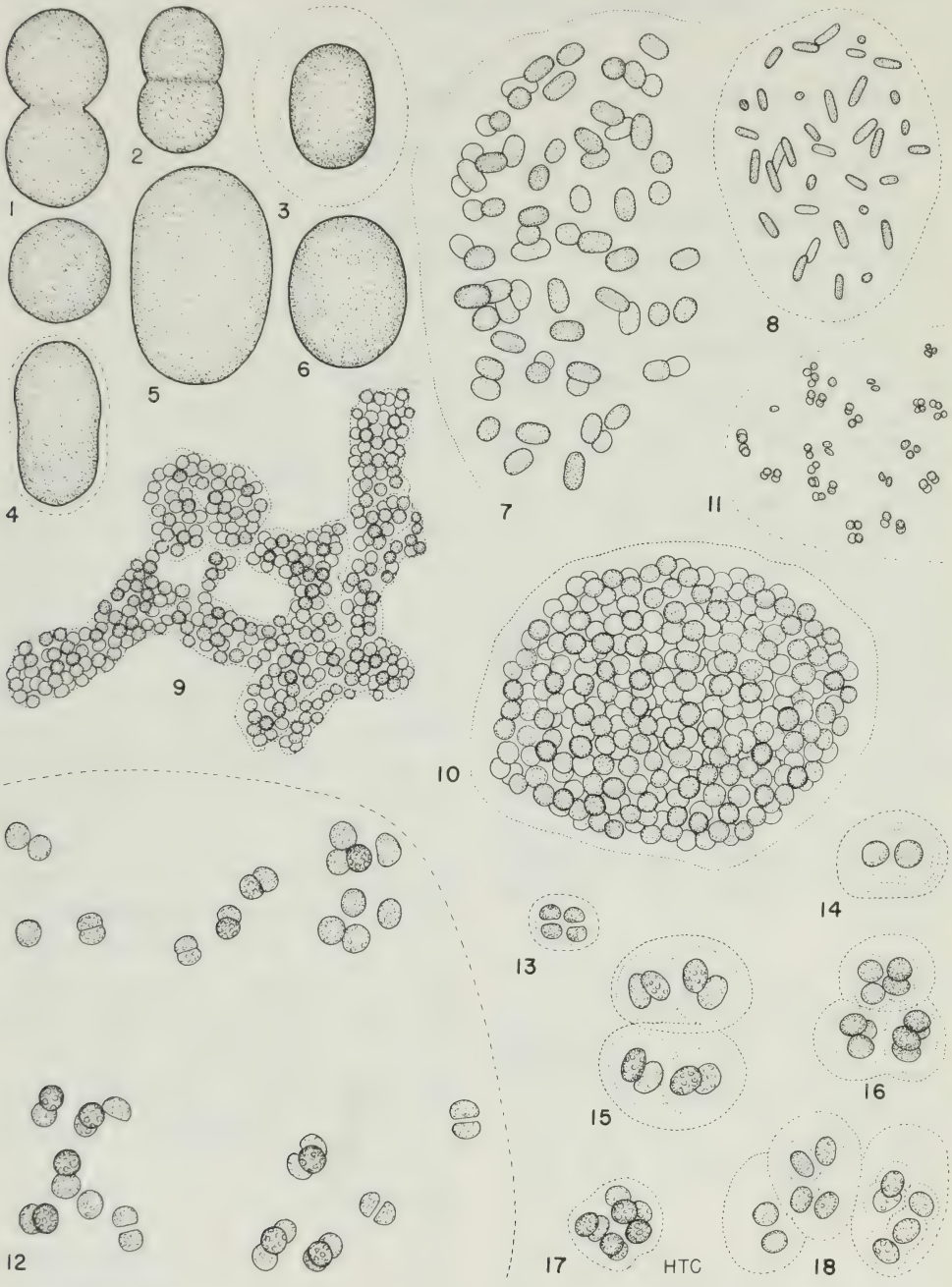
**Stations**
1-cc, 4-r, 6-c, 9-c, 10-c, 12-c, 13-r, 17-r, 18-o, 21A-o, 21C-o, 28-o, 30-cc, 31-o, 32A-r, 33-o, 34-c, 35-r, 36-r, 37-c, 38-o, 39-r, 42-cc, 43-r, 55-o, 76-r, 78-o, 79A-o.

*Anacystis marina* Drouet and Daily (including *Aphanothece nidulans* Richter)
Plate I, fig. 11

Cells 1-1.5 $\mu \times 2 \mu$, very small, without pseudovacuoles, distributed irregularly or in groups of 4 in colonial mucilage.

**Habitat**
Growing with *Coccochloris penio-*

## Plate I



*cystis* Drouet and Daily, on bottom of a semipermanent pond. August.

**Station**
32-cc.

---

*Anacystis montana* (Lightfoot) Drouet and Daily (including many *Gloeocapsa* species)
Plate I, figs. 12-18

Cells 3-5 $\mu$ × 3-7 $\mu$ (1-1.5 ×), colonies 9-13 $\mu$ × 60-65 $\mu$. Cells rather irregularly disposed in small or large colonies, individual sheaths sometimes distinct and sometimes lamellate.

**Habitat**
In squeezings from moss at edge, in bottom material and in open water in tarns, all sizes of ponds and a ditch. July, August.

**Stations**
9-cc, 10-r, 12-r, 13-r, 17-r, 18-r, 19-r, 27-r, 30-o, 32-r, 33-cc, 36-r, 37-r, 39-o, 43-r, 55-o, 67-r, 71-r.

---

*Anacystis thermalis* (Menegh.) Drouet and Daily f. *thermalis* (including *Chroococcus minutus* (Kütz.) Näg.)
Plate II, figs. 6-9

Cells 6-12 $\mu$ in diameter, colonies 12-39 $\mu$ × 19-56 $\mu$. Colonies 1-8-celled, sheaths thin and often lamellate, cells becoming spherical soon after division.

**Habitat**
In squeezings from moss at edge, also in bottom material and open water in tarns, all sizes of ponds, a creek and a ditch. June, July, August.

**Stations**
1-o, 4-r, 5-r, 9-c, 10-c, 11-r, 12-c, 13-c, 17-rr, 18-r, 19-r, 21A-c, 25-r, 27-r, 28-r, 31-r, 34-r, 35-o, 37-r, 39-o, 42-c, 43-r, 50-r, 76-r, 77-r, 79-r, 79A-r, 83-r.

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*Anacystis thermalis* (Menegh.) Drouet and Daily f. *major* (Lagerheim) Drouet and Daily (including *Chroococcus limneticus* Lemmermann)
Plate II, figs. 10, 11

Cells 5-7 $\mu$ in diameter; colonies 20-60 $\mu$ × 24-70 $\mu$, 8-128-celled. Cells in a ± cubical arrangement in homogeneous mucilage.

**Habitat**
In squeezings from moss at edge, also in open water of temporary and permanent ponds and a tarn. July, August.

**Stations**
1-r, 9-o, 13-c, 30-r, 39-r.

---

**Plate I (all × 730)**

**Figure**

1-6
*COCCOCHLORIS AERUGINOSA* Drouet and Daily, 18

7
*COCCOCHLORIS STAGNINA* Spreng., 18

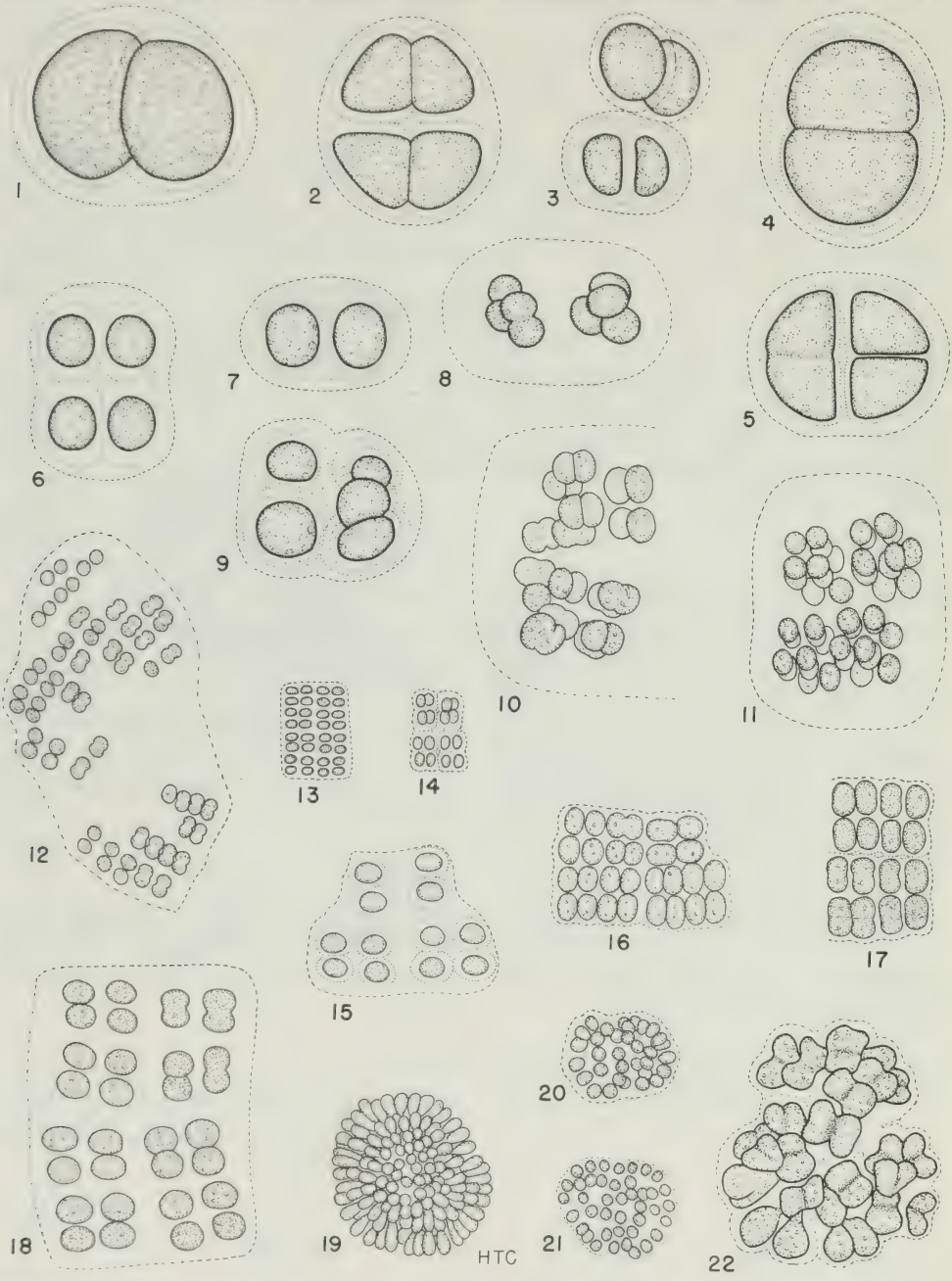
8
*COCCOCHLORIS PENIOCYSTIS* Drouet and Daily, 18

9, 10
*ANACYSTIS CYANEA* Drouet and Daily, 19

11
*ANACYSTIS MARINA* Drouet and Daily, 19

12-18
*ANACYSTIS MONTANA* (Lightf.) Drouet and Daily, 21

## Plate II



## *AGMENELLUM* de Brébisson 1839

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells 1-3 $\mu$ in diameter ..... | *A. quadruplicatum* |
| 1 | Cells 4-6 $\mu$ in diameter ..... | *A. thermale* |

*Agmenellum quadruplicatum* Bréb. (including *Merismopedia tenuissima* Lemmerm.)
Plate II, figs. 12-14

Cells 1-3 $\mu$ in diameter, colonies 9-40 $\mu$ × 15-60 $\mu$. Cells fairly regularly disposed in rows in 2 dimensions in a flat plate.

**Habitat**
In squeezings from moss at edge and on bottom and in open water of tarns and all sizes of ponds. July, August.

**Stations**
1-r, 3-r, 4-r, 5-r, 9-r, 10-r, 12-c, 13-cc, 17-r, 18-c, 19-r, 21A-r, 21B-r, 28-o, 30-o, 31-r, 32-rr, 33-r, 34-o, 38-r, 42-rr, 78-c, 79-r.

*Agmenellum thermale* (Kütz.) Drouet and Daily (including *Merismopedia glauca* (Ehrenberg) Kütz.)
Plate II, figs. 15-18

Cells 4-6 $\mu$ in diameter, colonies 13-35 $\mu$ × 29-53 $\mu$. In the Ellesmere material the cells are more rounded and often less regularly disposed than in *A. quadruplicatum*.

**Habitat**
In squeezings from moss at edge, on bottom and in open water of tarns and all sizes of ponds. July, August.

**Stations**
1-o, 4-r, 5-r, 9-c, 12-r, 13-o, 30-r, 31-o, 34-o, 35-r, 37-c, 38-o, 39-o, 42-c, 78-r, 79-r.

**Plate II (all × 730)**

**Figure**

1-5
*ANACYSTIS DIMIDIATA* Drouet and Daily, 19

6-9
*ANACYSTIS THERMALIS* (Menegh.) Drouet and Daily f. *THERMALIS*, 21

10, 11
*ANACYSTIS THERMALIS* (Menegh.) Drouet and Daily f. *MAJOR* (Lagerh.) Drouet and Daily, 21

12-14
*AGMENELLUM QUADRUPLICATUM* Bréb., 23

15-18
*AGMENELLUM THERMALE* (Kütz.) Drouet and Daily, 23

19-21
*GOMPHOSPHAERIA LACUSTRIS* Chod., 24

22
*GOMPHOSPHAERIA APONINA* Kütz., 24

## *GOMPHOSPHAERIA* Kützing 1836

**Key to the species found on Ellesmere Island**

1 Cells cordate, usually intensely blue-green, 4.5-8.5 μ in diameter ..... *G. aponina*
1 Cells round or ovoid, pale blue-green, 2-3 μ in diameter ..... *G. lacustris*

*Gomphosphaeria aponina* Kütz.
Plate II, fig. 22

Cells (3) 4.5-8.5 μ × 5-10 μ, colonies 30-60 μ × 36-80 μ. Cells very bright blue-green, somewhat heart-shaped, disposed in an irregular sphere.

**Habitat**
In squeezings from moss at edge, on bottom and in open water, also on shore of tarns and mostly permanent ponds. June, July, August.

**Stations**
1-c, 5-o, 10-r, 12-o, 13-c, 17-rr, 18-o, 19-r, 21A-r, 27-r, 28-o, 30-cc, 31-o, 33-c, 34-o, 36-r, 39-c, 42-o, 78-rr, 79-r, C-r.

*Gomphosphaeria lacustris* Chodat (including *Coelosphaerium naegelianum* Unger and *C. collinsii* Drouet and Daily)
Plate II, figs. 19-21

Cells 2-3 μ × 2-5 μ, colonies 17-33 μ × 22-45 μ. Cells pale blue-green, without pseudovacuoles, round or ovoid, in ± spherical colonies.

**Habitat**
In squeezings from moss at edge, on bottom, in open water, and on shore of tarns and mostly permanent ponds. July, August.

**Stations**
1-c, 4-c, 5-c, 9-r, 10-r, 13-c, 17-o, 18-o, 19-r, 21A-c, 28-r, 30-c, 31-o, 32-r, 33-c, 34-o, 35-r, 36-r, 39-cc, 78-rr, 79-r.

### Hormogonales

## *SCHIZOTHRIX* Kützing 1843

**Key to the species found on Ellesmere Island**

1 Trichomes less than 4 μ broad ..... *S. calcicola*
1 Trichomes 4 μ or more broad ..... *S. mexicana*

*Schizothrix calcicola* (Agardh) Gomont
Plate III, figs. 1-4
Trichomes 1-3.5 μ broad, cells 1-5.4 μ long. Trichomes without granules at cross-walls and without thickening of outer wall of end cell, not tapered at tips except in the end cell.

**Habitat**
In all situations in tarns and all sizes of ponds, also in creeks and ditches. June, July, August.

**Stations**
1-r, 9-c, 12-o, 17-rr, 18-c, 19-c, 21C-r, 25-o, 27-r, 30-c, 32-r, 32A-r, 34-r, 35-r, 39-r, 42-c, 49A-r, 50-r, 55-r, 76-r, 77-r, 80-r, F-r.

---

*Schizothrix mexicana* Gom.
Plate III, figs. 5-7

Trichomes 4-13 $\mu$ broad, cells 1-8 $\mu$ long. Trichomes without granules at cross-walls, without thickening of outer wall of end cell, not tapered at tips except in the end cell.

**Habitat**
In every situation in tarns and all sizes of ponds, also in creeks and seepage areas. June, July, August.

**Stations**
6-r, 12-o, 13-r, 17-r, 21A-o, 27-c, 28-r, 34-r, 35-o, 35A-r, 36-r, 38-r, 39-o, 49-cc, 49A-c, 50-r, 71-c, 78-o, 79-r, 79A-o, C-r, D-r.

---

## *PORPHYROSIPHON* Kützing 1850

**Key to the species found on Ellesmere Island**

1 Trichomes more than 4 $\mu$ broad, end cell rotund to acute-conical, a little longer than broad ..... *P. notarisii*
1 Trichomes less than 4 $\mu$ broad, end cell bulbous at tip, several times as long as broad .... *P. splendidus*

---

*Porphyrosiphon notarisii* (Menegh.) Kütz.
Plate III, figs. 8-11

Trichomes 4.5-5 $\mu$ broad, apex c. 2 $\mu$ broad, cells 2.5 $\mu$ long. Trichomes tapering, bent at end, terminal cell hemispherical, without thickening of outer wall.

**Habitat**
In squeezings from moss at edge of permanent ponds. July.

**Stations**
33-r, 39-r.

*Porphyrosiphon splendidus* (Greville) Drouet
Plate III, figs. 12-14

Trichomes 1-4 $\mu$ broad, cells 1-6 $\mu$ long. Trichomes narrow, tapering rather strongly, often bent; terminal cell long, bulbous or bulbous-conical at tip.

**Habitat**
In squeezings from moss at edge of a tarn and mostly permanent ponds, rarely from bottom, once in a creek. July, August.

**Stations**
1-o, 18-rr, 21C-r, 28-r, 36-r, 37-rr, 39-o, 49-c, 55-r, 78-o.

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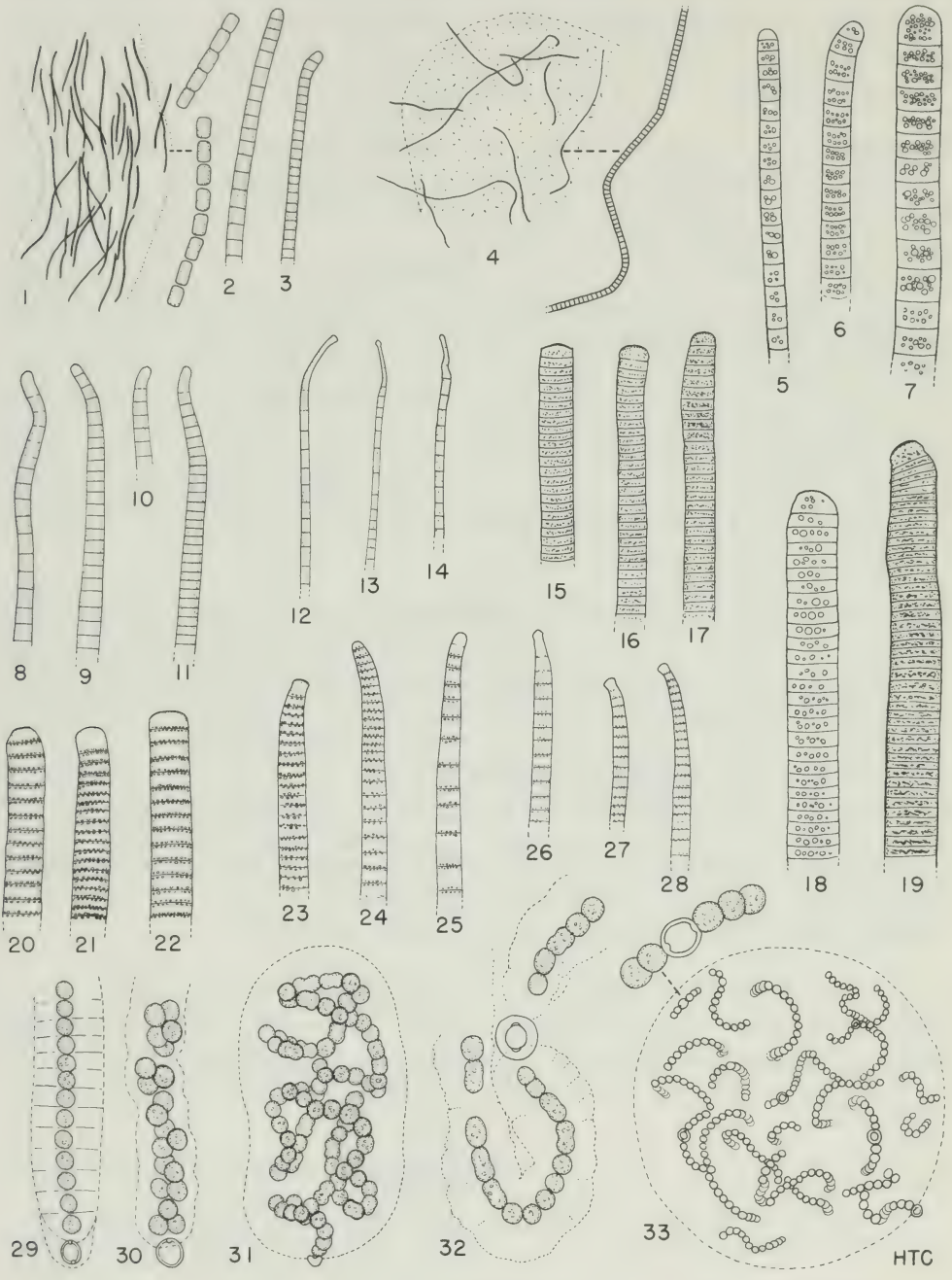
## Plate III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## *OSCILLATORIA* Vaucher 1803

**Key to the species found on Ellesmere Island**

1 Trichomes 11 $\mu$ or more broad, tapered at tip, cells very short ..... *O. princeps*
1 Trichomes 10 $\mu$ or less broad, not tapered at tip ..... 2
2 Cells mostly shorter than broad ..... *O. lutea*
2 Cells as long as broad or longer ..... *O. retzii*

*Oscillatoria lutea* Agardh
Plate III, figs. 15-17

Trichomes 6-9 $\mu$ broad, cells 1.7-4 $\mu$ long. Trichomes not tapered, outer wall of end cell thickened, cells usually much shorter than broad.

**Habitat**
In squeezings from moss, from bottom material and open water of tarns and mostly permanent ponds. June, July, August.

**Stations**
1-o, 4-c, 12-o, 18-c, 27-r, 28-c, 30-c.

*Oscillatoria princeps* Vauch.
Plate III, figs. 18, 19

Trichomes 11-12 $\mu$ broad, cells 2.5-3 $\mu$ long. Trichomes tapering at apex, outer wall of terminal cell thickened, cells very short.

**Habitat**
In squeezings from moss at edge of a tarn and mostly permanent ponds. August.

**Stations**
3-r, 13-o, 35-r.

**Plate III**

**Figure**

1-4
*SCHIZOTHRIX CALCICOLA* (Agardh) Gom. (1,4 × 110, × 640; 2,3 × 640), 24

5-7
*SCHIZOTHRIX MEXICANA* Gom. (×640), 25

8-11
*PORPHYROSIPHON NOTARISII* (Menegh.) Kütz. (×640), 25

12-14
*PORPHYROSIPHON SPLENDIDUS* (Grev.) Drouet (×640), 25

15-17
*OSCILLATORIA LUTEA* Agardh (×640), 27

18, 19
*OSCILLATORIA PRINCEPS* Vauch. (×640), 27

20-22
*MICROCOLEUS IRRIGUUS* (Kütz.) Drouet (×640), 28

23-28
*MICROCOLEUS VAGINATUS* (Vauch.) Gom. (×640), 28

29-33
*NOSTOC COMMUNE* Vauch. (29-32 × 640, 33 × 215), 28

*Oscillatoria retzii* Agardh

Trichomes 2.5-10 $\mu$ broad, cells 5-15 $\mu$ long, outer wall of end cell thickened, cells generally quadrate or longer than broad.

**Habitat**
Forming a scum on earth and in fresh water. September.

**Station**
E-cc (Whelden 1947: 29, as *Phormidium retzii* (Agardh) Gom.).

---

## *MICROCOLEUS* Desmazières 1823

**Key to the species found on Ellesmere Island**

1 Trichomes not tapered, end cell broadly rounded ..... *M. irriguus*
1 Trichomes tapered through several cells, end cell often conical ..... *M. vaginatus*

---

*Microcoleus irriguus* (Kütz.) Drouet
Plate III, figs. 20-22

Trichomes 7-8.5 $\mu$ broad, cells c. 3 $\mu$ long. Trichomes not tapered, straight or only slightly bent at apex, their cross-walls lined with granules, their end cells rounded with outer wall sometimes thickened.

**Habitat**
In squeezings from moss in a tarn, and "on stones now dry". July, September.

**Stations**
36-c, E-c (Whelden 1947 28, as *Oscillatoria tenuis* Agardh).

*Microcoleus vaginatus* (Vauch.) Gom.
Plate III, figs. 23-28

Trichomes 3-6 $\mu$ broad, 2-3 $\mu$ broad at apex, cells 1.8-6 $\mu$ long. Trichomes conspicuously tapered and usually slightly bent at apex, their cross-walls lined with small to large granules, their terminal cells sometimes capitate.

**Habitat**
In open water and on bottom of mostly temporary ponds and a stream, also in moss squeezings from seepage area. July, August.

**Stations**
2-r, 27-r, 35A-r, 37-r, 49A-r, 78-r.

---

## *NOSTOC* Vaucher 1803

*Nostoc commune* Vauch.
Plate III, figs. 29-33

Cells 2.5-7.5 $\mu$ × 2.5-7 $\mu$, heterocysts 4-9 $\mu$ × 4-10 $\mu$, in microscopic and macroscopic colonies. Macroscopic colonies appeared as solid or hollow spheres, commonly the size of a pea or a marble, but sometimes larger, sometimes lime-encrusted, sometimes broken open into irregular sheets, usually olive green or yellowish brown. Microscopic colonies showed a firm jelly, often brownish,

sometimes stratified, containing curled or contorted trichomes, made up mostly of spherical cells, with occasional larger heterocysts. Spores not seen.

The exceedingly variable material keyed with uncertainty to many different species, which seemed to intergrade. Samples were sent to Dr. Drouet, who said that all the material sent to him belonged to the one species: *N. commune*. He added that in their time the authorities Bornet and Flahault (1888) would have said that all the round ones were *N. pruniforme;* some had been so identified by him in earlier collections but he preferred now to consider them all *N. commune*.

**Habitat**
In all situations, in tarns, all sizes of ponds and in creeks, also on moist soil; one of the commonest bluegreens in the collections, and everywhere in the North. June, July, August.

**Stations**
1-cc, 2-r, 3-o, 4-r, 5-r, 6-c, 9-r, 10-cc, 12-c, 13-c, 17-cc, 18-cc, 19-c, 21A-c, 21B-c, 21C-c, 25-r, 26-r, 27-cc, 28-cc, 30-c, 31-o, 32-o, 32A-r, 33-c, 34-cc, 35-r, 35A-r, 36-r, 37-o, 38-cc, 39-c, 42-r, 43-r, 49A-r, 50-o, 50A-r, 67-r, 71-r, 76-r, 77-r, 78-c, 79-r, 79A-o, 80-c, A-r, F-r.

---

## *ANABAENA* Bory 1822

**Key to the species found on Ellesmere Island**

1 Trichomes 6 $\mu$ or more broad, spores not adjacent to heterocysts ..... *A. affinis*
1 Trichomes 5 $\mu$ or less broad, spores commonly on either side of heterocysts ..... *A. lapponica*

---

*Anabaena affinis* Lemmerm.
Plate IV, figs. 1, 2

Vegetative cells 4-6 $\mu$ × 5-6 $\mu$, heterocysts 6 $\mu$ × 5-6 $\mu$, spores 8-9 $\mu$ × 9-14 $\mu$. Trichomes solitary, straight or slightly curved, usually surrounded by a thin sheath. Cells and heterocysts mostly globose; spores rarely globose, commonly short-cylindrical, remote from the heterocysts.

**Habitat**
With other algae among mosses at edge of tarns and a temporary pond. July, August.

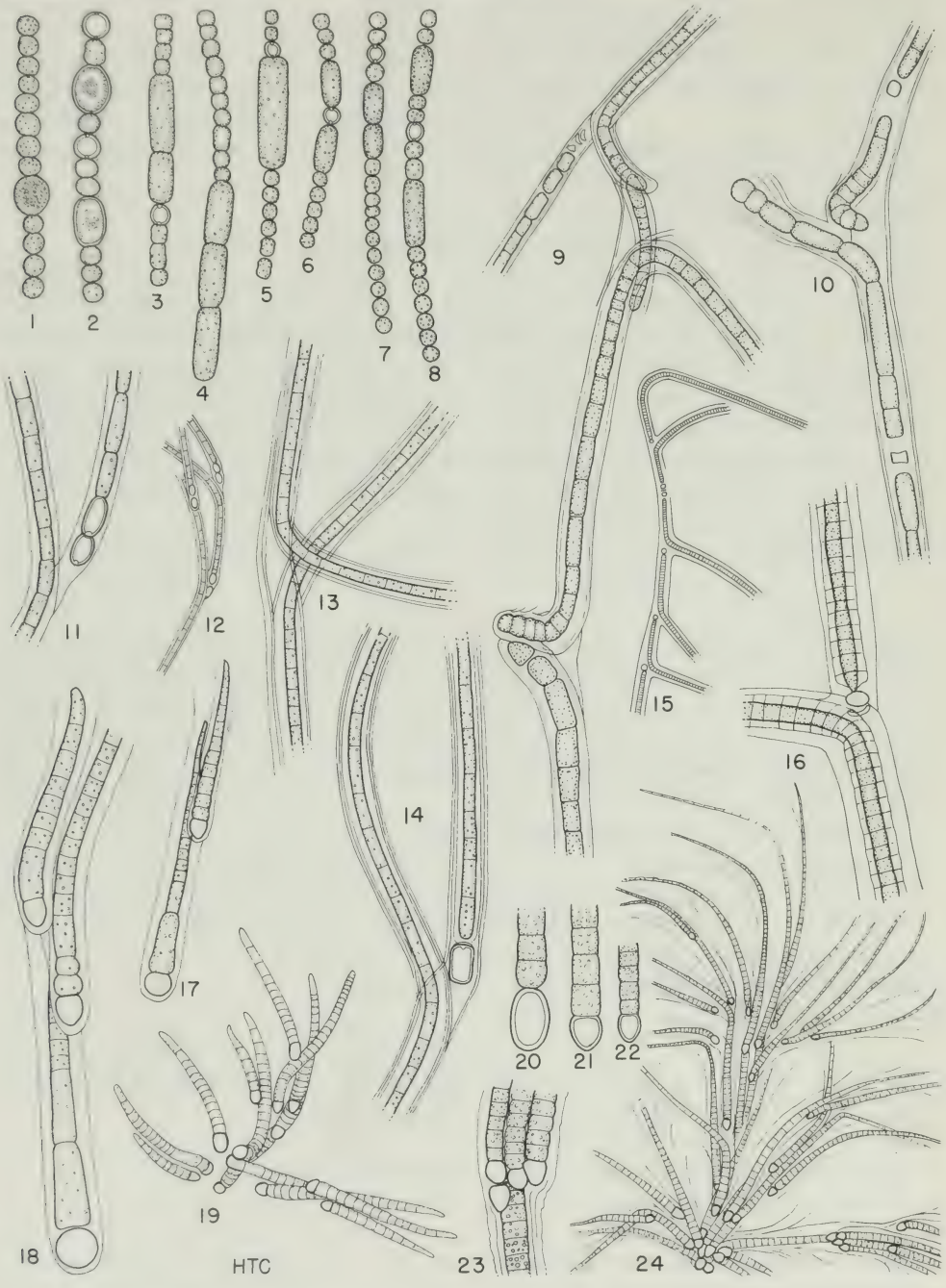
**Stations**
6-rr, 12-rr, 34-r.

---

*Anabaena lapponica* Borge morpha
Plate IV, figs. 3-8

Vegetative cells 3-5 $\mu$ × 2.5-5 $\mu$, heterocysts 3-5 $\mu$ × 3-7 $\mu$, spores 3.5-6 $\mu$ × 6-17 (27) $\mu$. Trichomes solitary, straight or slightly curved, without a sheath; cells spherical to short-cylindrical; heterocysts spherical; spores cylindrical, usually on one or both sides of heterocysts, occasionally remote. The Ellesmere form is smaller than Borge's and more

## Plate IV



variable, but seems to fit this species better than any other. Dr. Drouet confirmed this identification in the samples sent to him.

**Habitat**
In all situations, but mostly from squeezings from moss in seepage area and edge of tarns and all sizes of ponds; very common. July, August.

**Stations**
1-r, 4-o, 5-o, 6-r, 9-r, 10-cc, 12-r, 13-c, 18-rr, 19-r, 21A-o, 25-r, 27-r, 28-r, 30-r, 32-r, 32A-r, 34-c, 35-r, 35A-r, 36-r, 38-c, 39-r, 43-c, 49-r, 50-r, 55-r, 76-r, 83-o, C-r.

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*Anabaena* spp. (not fruiting, in most cases probably *A. lapponica*)

**Stations**
2-r, 3-r, 4-r, 5-r, 6-rr, 10-r, 13-o, 17-o, 18-r, 19-cc, 21A-cc, 21B-cc, 21C-cc, 27-o, 28-c, 30-r, 31-o, 34-c, 35-r, 36-r, 37-r, 39-c, 49A-r, 50-r, 78-r, 79-r, 79A-rr, 80-r.

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## *SCYTONEMA* C.A.Agardh 1824

*Scytonema figuratum* Agardh (including *S. mirabile* (Dillwyn) Bornet)
Plate IV, figs. 9-14

Filaments 7-18 $\mu$ broad, trichomes 3.5-8 $\mu$ broad, cells longer than broad. Filaments flexuous, much branched, with both single and paired false branches; sheaths lamellate, the lamellations sometimes slightly divergent. The Ellesmere plants were exceedingly variable and included forms that, in part of the filament, would easily key out to *Tolypothrix tenuis* Kütz.

**Habitat**
Generally distributed throughout tarns and all sizes of ponds. June, July, August.

**Stations**
1-cc, 9-o, 10-o, 11-r, 18-o, 19-o, 27-r, 30-cc, 39-r, 80-c.

---

**Plate IV**

**Figure**

1,2
*ANABAENA AFFINIS*
Lemmerm. (×550), 29

3-8
*ANABAENA LAPPONICA*
Borge morpha (×550), 29

9-14
*SCYTONEMA FIGURATUM*
Agardh (9-11, 13,14× 370, 12× 185), 31

15,16
*TOLYPOTHRIX DISTORTA*
Kütz. (15 × 185, 16 × 370), 32

17-19
*CALOTHRIX STAGNALIS*
Gom. (17 × 370, 18 × 550, 19 × 185), 32

20-24
*RIVULARIA HAEMATITES*
(de Cand.) Agardh (20-23 ×550, 24 × 185), 33

## *TOLYPOTHRIX* Kützing 1843

*Tolypothrix distorta* Kütz.
Plate IV, figs. 15, 16

Filaments 10-20 $\mu$ broad, trichomes 7-9 $\mu$ broad, cells averaging 4-5 $\mu$ long. Filaments with mostly single false branches arising from just below a heterocyst, sheaths somewhat thickened, mature cells shorter than broad.

**Habitat**
In squeezings from moss at edge of temporary pond, and in open water of a creek. July.

**Stations**
37-r, 50-rr.

## *CALOTHRIX* C.A.Agardh 1824

**Key to the species found on Ellesmere Island**

1 Akinetes present, cells shorter than long near base, longer than broad above, sheaths thin ..... *C. stagnalis*
1 Akinetes absent, cells mostly very short, sheaths thick ..... *C. parietina*

*Calothrix parietina* (Näg.) Thuret

Filaments 10-12 $\mu$ broad, trichomes 5-10 $\mu$ broad and without terminal hairs, heterocysts 6-10 $\mu$ broad, cells 2.5-3 $\mu$ long, sheath firm and relatively thick. Filaments solitary or in clusters, much twisted and contorted.

**Habitat**
Attached to *Nostoc* balls. June.

**Stations**
50-r, F-r.

*Calothrix stagnalis* Gom.
Plate IV, figs. 17-19

Filaments 10-15 $\mu$ broad, trichomes 4-7.5 $\mu$ broad and without terminal hairs, heterocysts 5-9 $\mu$ × 7-10 $\mu$, akinetes 9-10 $\mu$ × 20-22 $\mu$. Filaments attached singly or in small clusters to other algae, often sharply bent, tapering strongly from a basal heterocyst and spore.

**Habitat**
In a little bay on northwest shore of a tarn. August.

**Station**
10-r.

## *RIVULARIA* (Roth) C.A.Agardh 1824

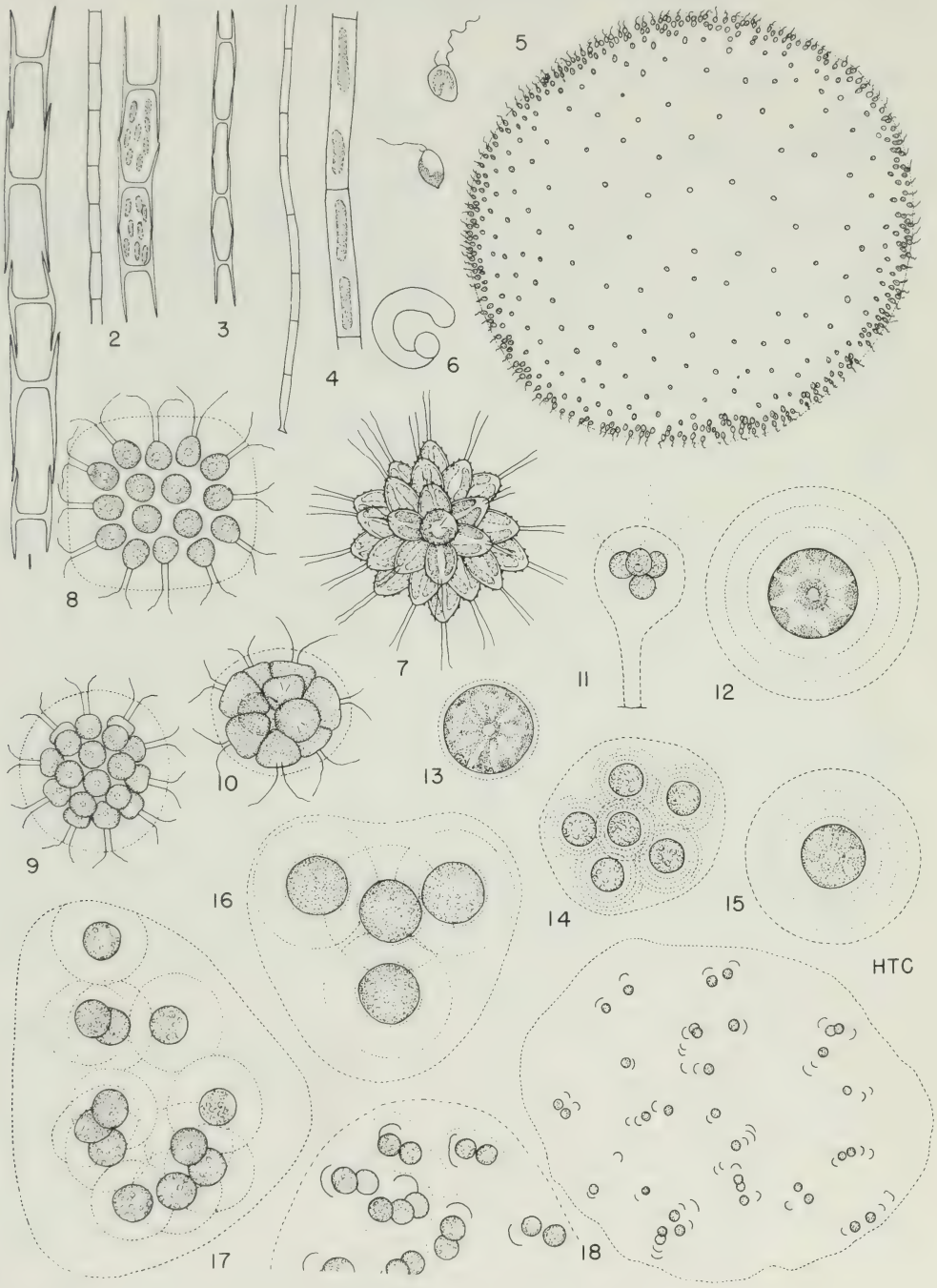
*Rivularia haematites* (de Candolle) Agardh
Plate IV, figs. 20-24

Filaments 10-26 $\mu$ broad, trichomes 5-8 $\mu$ broad near base, heterocysts 5-10 $\mu$ × 5-20 $\mu$, terminal hairs c. 2.5 $\mu$ broad. Filaments closely disposed in microscopic to macroscopic lime-encrusted colonies, the false branches often arising in zones; sheaths expanding to funnel-shape above.

**Habitat**
In tarns and mostly permanent ponds, usually on bottom with *Nostoc,* but found twice in squeezings from moss at edge. June, July.

**Stations**
1-r, 12-rr, 17-r, 19-c, 30-r, 35-r, 78-cc, 80-c.

## Plate V



**Key to the genera found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells solitary, or in loose clusters ..... | *Ophiocytium,* 35 |
| 1 | Cells united into colonies or filaments ..... | 2 |
| 2 | Cells in filaments ..... | *Tribonema,* 36 |
| 2 | Cells in ± spherical motile colonies ..... | 3 |
| 3 | Colonies composed of less than 100 cells, compactly arranged; cell wall scaly ..... | *Synura,* 37 |
| 3 | Cells composed of more than 100 cells, at periphery of very fragile sphere; walls smooth ..... | *Uroglena,* 37 |

**Xanthophyceae**

*OPHIOCYTIUM* Nägeli 1849

*Ophiocytium parvulum* (Perty) A. Braun
Plate V, fig. 6

Cells 4 $\mu$ broad, cylindrical, curved, rounded at the ends.

**Habitat**
Free floating, with other algae. June, August.

**Stations**
34-r, B-cc.

**Plate V**

**Figure**

1
*TRIBONEMA UTRICULOSUM* (Kütz.) Hazen (× 640), 36

2
*TRIBONEMA BOMBYCINUM* (Agardh) Derbès and Solier var. *BOMBYCINUM* (× 640), 36

3
*TRIBONEMA BOMBYCINUM* (Agardh) Derbès and Solier var. *TENUE* Hazen (× 640), 36

4
*TRIBONEMA AFFINE* G.S. West (×210,×640), 36

5
*UROGLENA AMERICANA* Calk. (X105,X640), 37

6
*OPHIOCYTIUM PARVULUM* (Perty) A. Braun (× 640), 35

7
*SYNURA UVELLA* Ehrenb. (× 425), 37

8
*GONIUM PECTORALE* Müll. (×425), 42

9
*EUDORINA ELEGANS* Ehrenb. (× 425), 43

10
*PANDORINA MORUM* (Müll.) Bory (×425), 42

11
*APIOCYSTIS BRAUNIANA* Näg. (×425), 43

12-15
*ASTEROCOCCUS SUPERBUS* (Cienk.) Scherf. (×425), 43

16,17
*GLOEOCYSTIS PLANCTONICA* (West and West) Lemmerm. (×425), 43

18
*SCHIZOCHLAMYS GELATINOSA* A. Braun (× 215, × 425), 44

## *TRIBONEMA* Derbès and Solier 1856

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells with 2 chromatophores, H-shape of cell wall not noticeable ..... | *T. affine* |
| 1 | Cells with 4 or more chromatophores, H-shape often evident ..... | 2 |
| 2 | Average cell length more than 25 $\mu$, wall thick, H-shape evident ..... | *T. utriculosum* |
| 2 | Average cell length less than 25 $\mu$, wall thin, H-shape often not evident ..... | *T. bombycinum* |

*Tribonema affine* G.S. West
Plate V, fig. 4

Cells 5 $\mu$ × 30-36 $\mu$, long and thin with 2 chromatophores; H-shaped wall structure not noticeable.

**Habitat**
In open water of a creek. July.

**Station**
50-o.

*Tribonema bombycinum* (Agardh) Derbès and Solier var. *bombycinum* (*T. viride* Pascher 1925: 106)
Plate V, fig. 2

Cells 7-7.5 $\mu$ × 17-22 $\mu$, short and slightly constricted at the cross-walls, with 6 to 8 chromatophores.

**Habitat**
In squeezings from moss at edge of tarn. July.

**Station**
34-r.

*Tribonema bombycinum* (Agardh) Derbès and Solier var. *tenue* Hazen (1902: 185)
Plate V, fig. 3

Cells 5 $\mu$ × 14-18 $\mu$, constricted at cross-walls, with about 6 chromatophores; H-shaped structure of wall clearly evident.

**Habitat**
In squeezings from moss in and near a temporary pond. July.

**Station**
6-r.

*Tribonema utriculosum* (Kütz.) Hazen
Plate V, fig. 1

Cells 8-10 $\mu$ × 25-50 $\mu$, long and not constricted at cross-walls; chromatophores not clear; wall thick, H-shaped structure evident.

**Habitat**
In squeezing from moss from bottom of tiny temporary pond. July.

**Station**
2-r.

## Chrysophyceae

### *SYNURA* Ehrenberg (1833) 1835

*Synura uvella* Ehrenb.
Plate V, fig. 7

Cells 8-10 $\mu$ × 15-20 $\mu$, in free-swimming compact colonies, without mucilage, showing very short spines on their free surfaces; flagella subequal.

**Habitat**
In open water of tarn. July.

**Station**
12-rr.

### *UROGLENA* Ehrenberg (1833) 1835

*Uroglena americana* Calkins (in Skuja 1948: 266)
Plate V, fig. 5

Cells 5-6 $\mu$ × 7-9 $\mu$, at periphery of large fragile colonies that readily disintegrate in preservative. Cells pear-shaped, with blunt end toward periphery, bearing 2 very unequal flagella and single eyespot. Bourrelly (1968: 84) confirms Skuja in reuniting *Uroglenopsis* Lemmerm. with *Uroglena*.

**Habitat**
In plankton of permanent ponds and tarns. July, August.

**Stations**
1-cc, 4-cc, 30-cc. Probably more widespread, but not recognized because of its disintegration in preservative.

**Key to the genera found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Plants swimming in vegetative state (in preserved material look for traces of flagella or their insertion) | 2 |
| 1 | Plants not swimming in vegetative state | 4 |
| 2 | Cells united in flat plates of 4 to 32 cells | *Gonium,* 42 |
| 2 | Cells united in spherical colonies | 3 |
| 3 | Cells crowded, angular from compression | *Pandorina,* 42 |
| 3 | Cells not crowded, spherical or ovoid | *Eudorina,* 43 |
| 4 | Plants filamentous | 47 |
| 4 | Plants not filamentous, solitary or in colonies | 5 |
| 5 | Cells in colonies | 6 |
| 5 | Cells solitary (sometimes aggregated but not in colonies) | 26 |
| 6 | Colonies composed of cells surrounded by jelly or by old mother-cell wall | 7 |
| 6 | Colonies not surrounded by jelly or by mother-cell wall | 16 |
| 7 | Cells in twos, fours or eights (rarely more), lying without order in intact mother-cell wall | 8 |
| 7 | Cells surrounded by jelly | 9 |
| 8 | Cells 18 $\mu$ in diameter or less, not reniform, walls thin | *Oocystis,* 58 |
| 8 | Cells 18 $\mu$ in diameter or more, slightly reniform, walls very thick | *Oonephris,* 59 |
| 9 | Colonies elongate, straight, curved or tangled, forming false filaments | 10 |
| 9 | Colonies spherical or amorphous | 12 |
| 10 | Cells fusiform, pointed, more than 5 times as long as broad | *Ankistrodesmus,* 60 |
| 10 | Cells spherical or ovoid, less than 3 times as long as broad | 11 |
| 11 | Cells ovoid, lying end to end in pairs, uniseriately in unbranched tube | *Geminella,* 44 |
| 11 | Cells spherical, irregularly arranged in branched tube | *Palmodictyon,* 52 |
| 12 | Colonies pear- or club-shaped, attached by stalk | *Apiocystis,* 43 |
| 12 | Colonies spherical, pyramidal or amorphous | 13 |
| 13 | Colonies amorphous, sometimes macroscopic | 14 |
| 13 | Colonies spherical or pyramidal, microscopic | 15 |

14 Jelly firm, yellowish; cells ovate, crowded, with individual sheaths ..... *Botryococcus,* 57
14 Jelly, soft, colourless, homogeneous; cells loosely distributed, fragments of old mother-cell walls present ..... *Schizochlamys,* 44
15 Cells with star-shaped chloroplast with large central pyrenoid ..... *Asterococcus,* 43
15 Cells with cup-shaped chloroplast, pyrenoid inconspicuous ..... *Gloeocystis,* 43
16 Cells adjoined by their sides and/or their ends to form a colony of definite shape (coenobium) ..... 17
16 Cells adjoined or merely associated otherwise, not forming a coenobium ..... 21
17 Colony of only 2 trapezoid cells, adjoined by base and notched at apex ..... *Euastropsis,* 56
17 Colony otherwise, usually of more than 2 cells ..... 18
18 Colony forming a sphere, cells with protuberances on outer surfaces ..... *Coelastrum,* 56
18 Colony forming a flat plate ..... 19
19 Colony circular, cells 4-6-angled ..... *Pediastrum,* 53
19 Colony with cells in rows or flat groups of 4, cells oval or fusiform ..... 20
20 Cells in single or double rows, adjoined by their sides ..... *Scenedesmus,* 63
20 Cells in groups of 4 in a flat plate ..... *Crucigenia,* 65
21 Cells thin, lunate, normally solitary but occasionally aggregated in a pseudocolony ..... *Ankistrodesmus,* 60
21 Cells isodiametric, in irregular colonies or pseudocolonies ..... 22
22 Cells of pseudocolony not bearing spines 23
22 Cells of pseudocolony bearing spines ..... 24
23 Cells tightly packed, with thick walls ..... *Protococcus,* 48
23 Cells tightly packed in centre but projecting outward in very short free filaments, thin-walled ..... *Protoderma,* 47
24 Filamentous nature of pseudocolony evident, cells compressed where joined, only few cells bearing spines ..... *Coleochaete,* 48
24 Nonfilamentous nature of colony shown by cells merely being aggregated, adjoining walls not flattened, most cells with spines ..... 25
25 Cells bearing one spine ..... *Chaetosphaeridium,* 49
25 Cells bearing more than one spine ..... *Conochaete,* 49

26 Cells definitely constricted in mid-region to form 2 semicells that are mirror images of each other ..... 40
26 Cells not constricted in mid-region ..... 27
27 Cells lunately curved or sickle-shaped ..... 28
27 Cells of some other shape ..... 30
28 Cells with stalk, usually attached ..... *Characium,* 52
28 Cells without stalk, free-floating ..... 29
29 Cells narrow, less than 4 $\mu$ in diameter, chloroplast continuous ..... *Ankistrodesmus,* 60
29 Cells more than 4 $\mu$ in diameter, chloroplast distinct in each semicell ..... *Closterium,* 71
30 Cells more than 3 times longer than broad ..... 31
30 Cells less than 3 times longer than broad ..... 34
31 Cells tapering to narrow pole, wall smooth or striate ..... *Closterium,* 71
31 Cells not, or very slightly, tapering ..... 32
32 Wall smooth ..... *Cylindrocystis,* 69
32 Wall coarsely granular ..... 33
33 Cells with transverse line(s) and very slight median indentations ..... *Penium,* 70
33 Cells without transverse lines and with no median indentations ..... *Gonatozygon,* 68
34 Cells oblong, ovate or short-cylindrical ... 35
34 Cells spherical or angular ..... 38
35 Cells abruptly tapered to poles where wall is often somewhat thickened or nodular ..... *Oocystis,* 58
35 Cells with broadly rounded poles ..... 36
36 Cells with slight median excavation ..... 37
36 Cells with no median excavation ..... *Cylindrocystis,* 69
37 Wall smooth or punctate ..... *Actinotaenium,* 78
37 Wall striate ..... *Penium,* 70
38 Cells angular ..... *Tetraëdron,* 61
38 Cells spherical ..... 39
39 Cells with smooth wall ..... *Asterococcus,* 43
39 Cells with ornamented wall ..... *Trochiscia,* 57
40 Cells with median indentation, with single chloroplast extending across cell *Tetraëdron,* 61
40 Median indentation marking semicells, each with its own chloroplast(s) (desmids) 41
41 Cells cylindrical, more than 4 times as long as broad ..... *Pleurotaenium,* 76
41 Cells some other shape ..... 42
42 Median constriction very slight ..... 43
42 Median constriction well marked ..... 44

| | |
|---|---|
| 43 Wall striate or granular | *Penium,* 70 |
| 43 Wall smooth or punctate | *Actinotaenium,* 78 |
| 44 Apical view usually compressed | 45 |
| 44 Apical view usually angular | 46 |
| 45 Cell wall with a few surface protuberances, apex notched or excavate | *Euastrum,* 77 |
| 45 Cell wall with only one slight median protuberance, if any; apex usually rounded | *Cosmarium,* 82 |
| 46 Wall smooth | 47 |
| 46 Wall roughened with spines or granules | 48 |
| 47 Angles ending in spines or knobs, sinus wide | *Staurodesmus,* 111 |
| 47 Angles not ending in spines or knobs, sinus narrow | *Staurastrum,* 112 |
| 48 Filaments unbranched | 49 |
| 48 Filaments branched | 60 |
| 49 Filaments at least in part biseriate | *Schizogonium,* 45 |
| 49 Filaments always uniseriate | 50 |
| 50 Filaments more than 30 $\mu$ broad | *Rhizoclonium,* 49 |
| 50 Filaments less than 30 $\mu$ broad | 51 |
| 51 Protoplast not filling cell, consisting of rounded bodies, usually in pairs, surrounded by much colourless mucilage | 52 |
| 51 Protoplast filling cell (although chloroplast may not) | 53 |
| 52 Protoplasts ovoid, in pairs end to end; no cross-walls or lamellations (not a true filament) | *Geminella,* 44 |
| 52 Protoplasts ovoid or quadrate with rounded corners, cross-walls and lamellations in mucilage evident (a true filament) | *Binuclearia,* 44 |
| 53 Chloroplasts conspicuous, with prominent pyrenoids | 54 |
| 53 Chloroplasts inconspicuous, usually parietal, pyrenoids absent or inconspicuous | 58 |
| 54 Chloroplast(s) axile | 55 |
| 54 Chloroplast(s) parietal | 57 |
| 55 Chloroplast one thin axial plate | *Mougeotia,* 68 |
| 55 Chloroplasts usually 2, stellate, with central pyrenoid | 56 |
| 56 Cell with slight median constriction | *Hyalotheca,* 117 |
| 56 Cell without slight median constriction | *Zygnema,* 68 |
| 57 Chloroplasts one or more spiral bands with many pyrenoids | *Spirogyra,* 67 |
| 57 Chloroplast an incomplete horizontal band with one to few pyrenoids | *Ulothrix,* 44 |
| 58 Cells shorter than broad | *Ulothrix,* 44 |
| 58 Cells longer than broad | 59 |

| | |
|---|---|
| 59 Cells cylindrical or barrel-shaped, broken filaments ending in H-shaped pieces | *Microspora,* 45 |
| 59 Cells with abrupt swelling in middle or slight swelling at upper end | *Oedogonium,* 51 |
| 60 Filaments branched, cells bearing spines or setae | 61 |
| 60 Filaments branched, cells without spines or setae | 62 |
| 61 Seta ending in a bulbous base | *Bulbochaete,* 49 |
| 61 Seta with sheathed, not bulbous base | *Coleochaete,* 48 |
| 62 Plants very small and bushy, the cells 3 to 6 times as long as broad | *Microthamnion,* 48 |
| 62 Plants disc- or cushion-like, the cells isodiametric | 63 |
| 63 Cells wholly adjoined in tight packets, cell wall thick | *Protococcus,* 48 |
| 63 Cells thrusting out in short filaments from margin, cell wall thin | *Protoderma,* 47 |

## Volvocales

### *GONIUM* Müller 1773

*Gonium pectorale* Müll.
Plate V, fig. 8

Cells 9-15 $\mu$ in diameter, colonies including sheath 36-70 $\mu$ in diameter. Cells with 2 equal flagella, loosely but rather regularly arranged in a flat plate.

**Habitat**
In squeezings from moss at edge and bottom of permanent and semipermanent ponds and a tarn, also in surface mat of algae and in open water. July, August.

**Stations**
4-r, 21A-r, 31-r, 34-r, 71-cc.

### *PANDORINA* Bory 1824

*Pandorina morum* (Müll.) Bory
Plate V, fig. 10

Cells 9-18 $\mu$ in diameter, colonies including sheath 27-46 $\mu$ in diameter. Cells with 2 equal flagella, compactly arranged more or less spherically.

**Habitat**
In squeezings from moss at edge, also in bottom material and open water of a lake, tarns, permanent and semipermanent ponds. July, August.

**Stations**
10-o, 11-r, 12-rr, 19-r, 21A-o, 28-r, 31-o, 32-rr, 34-o, 38-r, 71-c, 78-o, 79A-r.

### *EUDORINA* Ehrenberg 1832

*Eudorina elegans* Ehrenb.
Plate V, fig. 9

Cells 9-17 $\mu$ in diameter, colonies including sheath 47-66 $\mu$ in diameter. Cells with 2 equal flagella, loosely arranged at periphery of more or less spherical colony.

**Habitat**
In open water and squeezings from moss in tarns and permanent ponds. July, August.

**Stations**
12-o, 17-r, 32-rr, 36-r.

## Tetrasporales

### *APIOCYSTIS* Nägeli 1849

*Apiocystis brauniana* Näg.
Plate V, fig. 11

Cells 8 $\mu$ in diameter, colonies 26 $\mu$ × 58 $\mu$. Only one young plant seen.

**Habitat**
In open water of temporary pond. July.

**Station**
27-rr.

### *ASTEROCOCCUS* Scherffel 1908

*Asterococcus superbus* (Cienkowski) Scherf.
Plate V, figs. 12-15

Cells including sheath 20-72 $\mu$ in diameter, cells with stellate chloroplast and central pyrenoid. In the preserved material from Ellesmere the sheath often appeared very thin and the lamellations were not clear.

**Habitat**
In squeezings from moss at edge and bottom of tarns and permanent ponds. June, July, August.

**Stations**
1-rr, 10-r, 13-r, 18-r, 19-r, 30-o, 31-r, 33-rr.

### *GLOEOCYSTIS* Nägeli 1849

*Gloeocystis planctonica* (West and West) Lemmerm.
Plate V, figs. 16, 17

Cells not including sheath 9-13 $\mu$ in diameter; colonies irregularly spherical or pyramidal, 50-120 $\mu$ in diameter.

**Habitat**
In squeezings from moss and in open water in permanent ponds. July, August.

**Stations**
13-r, 33-r.

### *SCHIZOCHLAMYS* A. Braun 1849

*Schizochlamys gelatinosa* A. Braun
Plate V, fig. 18

Cells 7 $\mu$ in diameter, colonies to 230 $\mu$ in diameter. Cells sparsely and irregularly distributed in colonial mucilage, with fragments of mother-cell walls evident.

**Habitat**
In open water and in squeezings of moss from edge of permanent ponds. July.

**Stations**
21B-o, 55-r.

## Ulotrichales

### *ULOTHRIX* Kützing 1833

*Ulothrix zonata* (Weber and Mohr) Kütz.
Plate VI, fig. 1

Cells 10-25 $\mu$ broad, 1/2 to 1 times as long; chloroplast covering c. 2/3 of the cell, containing 2 to 4 pyrenoids.

**Habitat**
In open water of a large permanent pond. July.

**Station**
78-cc.

### *GEMINELLA* Turpin 1828

*Geminella interrupta* (Turp.) Lagerh.
Plate VI, figs. 2, 3

Cells 5-6 $\mu$ broad, 7-10 $\mu$ long; filaments 13-20 $\mu$ broad, unbranched, uniseriate, the ovoid cells separated from each other in pairs, enclosed in a broad, mostly homogeneous gelatinous sheath. Individual cell sheaths sometimes distinct, sometimes obscure; chloroplast parietal, extending across only middle third of cell; pyrenoid indistinct.

**Habitat**
In a tarn and temporary, permanent and semipermanent ponds, in open water and in squeezings from moss at edge. July.

**Stations**
17-r, 30-o, 43-rr, 71-c.

### *BINUCLEARIA* Wittrock 1886

*Binuclearia tectorum* (Kütz.) Beger (including *B. tatrana* Wittr.)
Plate VI, figs. 4-7

Filaments 5-15 $\mu$ broad; cells 4-10 $\mu$ broad, 7.5-30 $\mu$ long. Filaments uniseriate, with irregularly thickened cross-walls; cells thus somewhat remote, often in pairs, quadrate or rarely shorter but mostly longer than

broad; chloroplast parietal, extending wholly or nearly across cell; no pyrenoid seen. Superficially this plant resembles *Geminella* but is distinguished by the presence of cross-walls with frequent cross lamellations.

**Habitat**
In all situations in tarns, ponds of all sizes and a creek; very common and extremely variable. July, August.

**Stations**
1-r, 3-r, 5-r, 9-r, 10-c, 13-c, 18-c, 19-c, 21B-c, 21C-c, 26-r, 27-o, 28-r, 30-r, 34-o, 35-r, 36-r, 37-o, 38-o, 39-r, 50-r, 71-c, 79A-r, C-r.

---

## *MICROSPORA* Thuret 1850

**Key to the species found on Ellesmere Island**

1 Filament not constricted at cross-walls, wall thin ..... *M. stagnorum*
1 Filament somewhat constricted at cross-walls, wall rather thick ..... *M. tumidula*

---

*Microspora stagnorum* (Kütz.) Lagerh.
Plate VI, figs. 8, 9

Filaments 6-10 $\mu$ broad; cells 5-6 $\mu$ broad, 8-11 $\mu$ long. Filaments cylindrical; H-shaped structure of walls not evident except occasionally at broken ends of filaments.

**Habitat**
In a tarn, a temporary pond and a creek, in open water and in squeezings from moss at edge. July, August.

**Stations**
10-o, 37-o, 49-r.

*Microspora tumidula* Hazen
Plate VI, figs. 10-12

Filaments 6-7 $\mu$ broad; cells 5-6 $\mu$ broad, 9-12 (16) $\mu$ long. Filaments somewhat constricted, H-shaped structure evident only at broken ends of filaments. In one case (fig. 11) the wall showed an incrustation of ?iron, as noted by Ramanathan (1964: 122).

**Habitat**
In a tarn, a temporary and a permanent pond, and a creek. July.

**Stations**
9-o, 10-rr, 19-r, 49-r, 49A-r.

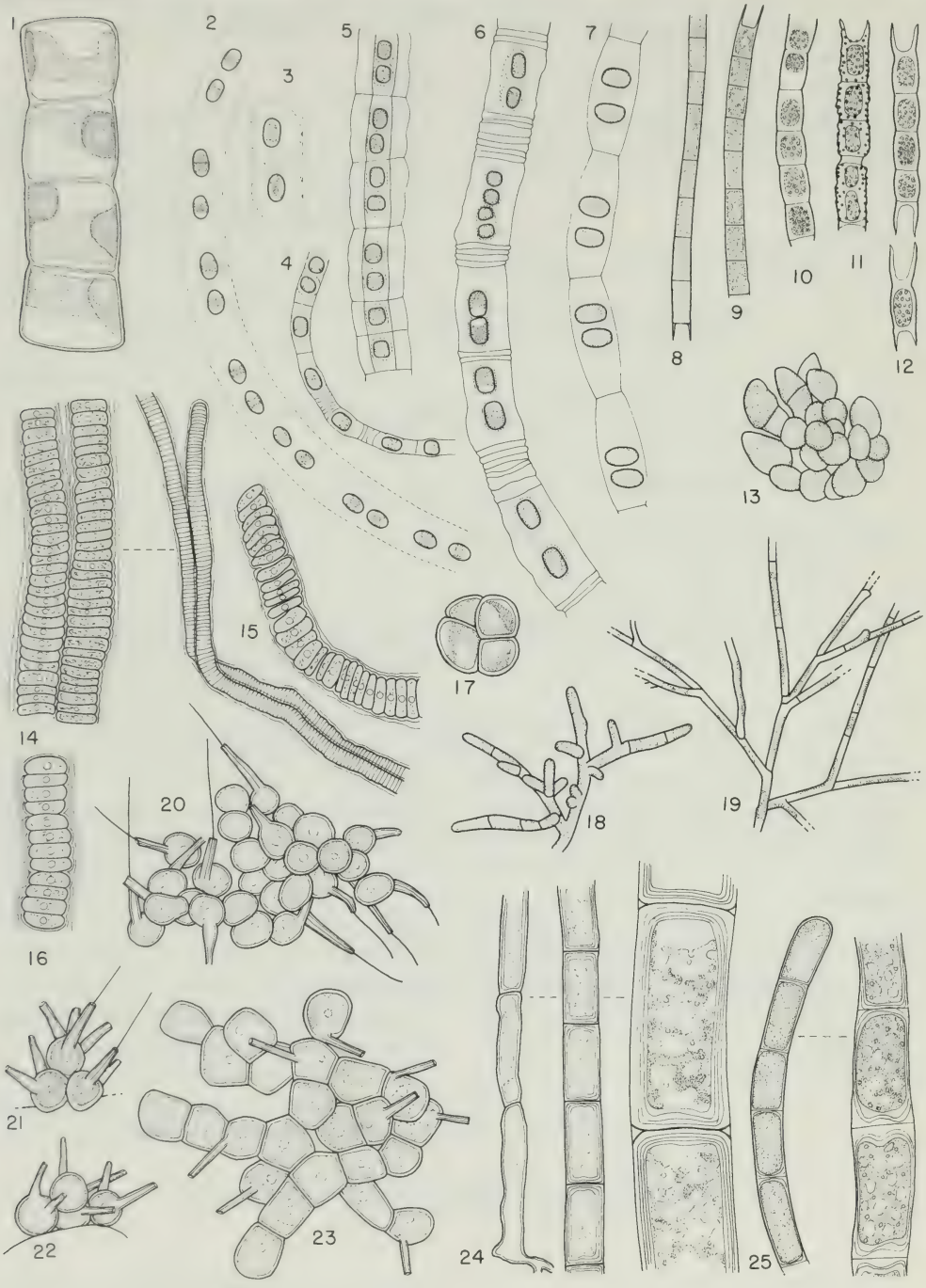
---

## *SCHIZOGONIUM* Kützing 1843

*Schizogonium murale* Kütz.
Plate VI, figs. 14-16

Single filaments 12-14 $\mu$ broad; cells compressed, 8-10 $\mu$ broad, 2-3 $\mu$ long. Filaments uniseriate or biseriate, containing somewhat irregular cells within a firm sheath that becomes slightly stratified with age; chloroplast stellate with central pyrenoid.

## Plate VI



This genus is often considered to be merely a stage in the life history of *Prasiola* Menegh. However, in the Ellesmere material it was found only in this form.

**Habitat**
Usually on moist soil, rocks, trees, etc. July.

**Station**
B-o (*det* Drouet).

## Chaetophorales

### *PROTODERMA* Kützing 1843

*Protoderma viride* Kütz.
Plate VI, fig. 13

Thallus 34 $\mu \times 42\mu$; cells 10 $\mu$ broad, 10-15 $\mu$ long. Cells arranged irregularly in a nearly flat disc, compact in centre, spreading at margin, the free ends of the cells bluntly pointed; chloroplast parietal, pyrenoids indistinct.

**Habitat**
On stones in lake, 2 inches from edge in 20 cm of water. July.

**Station**
A-r.

## Plate VI

**Figure**

1
*ULOTHRIX ZONATA* (Web. and Mohr) Kütz. (×535), 44

2,3
*GEMINELLA INTERRUPTA* (Turp.) Lagerh. (×535), 44

4-7
*BINUCLEARIA TECTORUM* (Kütz.) Beger (×535), 44

8,9
*MICROSPORA STAGNORUM* (Kütz.) Lagerh. (×535), 45

10-12
*MICROSPORA TUMIDULA* Hazen (×535), 45

13
*PROTODERMA VIRIDE* Kütz. (×535), 47

14-16
*SCHIZOGONIUM MURALE* Kütz. (14×175,×535;15,16 ×535), 45

17
*PROTOCOCCUS VIRIDIS* Agardh (×535), 48

18
*MICROTHAMNION KUETZINGIANUM* Näg. (×535), 48

19
*MICROTHAMNION STRICTISSIMUM* Rabenh. (×535), 48

20
*CHAETOSPHAERIDIUM GLOBOSUM* (Nordst.) Kleb. (×355), 49

21,22
*CONOCHAETE COMOSA* Kleb. (×355), 49

23
*COLEOCHAETE IRREGULARIS* Pringsh. (×355), 48

24,25
*RHIZOCLONIUM HIEROGLYPHICUM* (Kütz.) Stockm. (24 ×90, 25 ×175), 49

## *PROTOCOCCUS* C.A. Agardh 1824

*Protococcus viridis* Agardh *(Pleurococcus lobatus* Chod., *Apatococcus lobatus* (Chod.) Boye-Petersen 1928)
Plate VI, fig. 17

Colonies 22 $\mu$ broad, cells 10-12 $\mu$ broad. Cells in small compact colonies, chloroplast massive and lobed, no pyrenoid evident, wall thick.

**Habitat**
On wet moss 5 feet from edge of permanent pond. July.

**Station**
1-r.

## *MICROTHAMNION* Nägeli 1849

**Key to the species found on Ellesmere Island**

1 Branching dense, main axis not recognizable *M. kuetzingianum*
1 Branching sparse, main axis recognizable .... *M. strictissimum*

*Microthamnion kuetzingianum* Näg.
Plate VI, fig. 18

Cells 3 $\mu$ broad, 10 $\mu$ long (about 3 times as long as broad). Filaments small and much branched, with many branches arising from the basal cell, the main axis not recognizable.

**Habitat**
In squeezings from wet moss 5 feet from edge of a permanent pond. July.

**Station**
79-o.

*Microthamnion strictissimum* Rabenhorst
Plate VI, fig. 19

Cells 3-4 $\mu$ broad, 7-22 $\mu$ long (up to 6 times as long as broad). Filaments sparsely branched, main axis recognizable.

**Habitat**
In open water of a very small temporary pond. July.

**Station**
2-r.

## *COLEOCHAETE* de Brébisson 1844

*Coleochaete irregularis* Pringsheim
Plate VI, fig. 23

Cells 17-20 $\mu$ broad, nearly quadrate, irregularly united in short filaments to form an incomplete disc; occasional cells bearing setae sheathed at the base.

**Habitat**
In open water of permanent pond. July.

**Station**
3-r.

### *CHAETOSPHAERIDIUM* Klebahn 1892

*Chaetosphaeridium globosum* (Nordstedt) Kleb.
Plate VI, fig. 20

Colonies about 120 $\mu$ × 65 $\mu$; cells 12-18 $\mu$ broad, mostly globose, in an irregular group, each with a single sheathed seta.

**Habitat**
In open water of permanent ponds. July.

**Stations**
18-r, 31-r.

### *CONOCHAETE* Klebahn 1893

*Conochaete comosa* Kleb.
Plate VI, figs. 21, 22

Cells 12-18 $\mu$ broad, setae 3-5 $\mu$ at base. Cells in clusters of a few cells on filamentous algae, each bearing 2 to 4 setae sheathed at base; sheaths thin, firm. The Ellesmere form is relatively small and thin-walled.

**Habitat**
On filamentous algae on bottom, at edge and in open water of permanent and temporary ponds. July.

**Stations**
18-r, 31-r, 37-rr, 43-o.

## Cladophorales

### *RHIZOCLONIUM* Kützing 1843, emend Brand 1908

*Rhizoclonium hieroglyphicum* (Kütz.) Stockmeyer
Plate VI, figs. 24, 25

Filaments 34-78 $\mu$ broad, cells to 200 $\mu$ long. Filaments coarse, irregular, unbranched; wall thick, often lamellated; chloroplast a dense or open parietal network. Some of the forms seen (fig. 24) were considerably larger than the size given for the species (10-52 $\mu$ broad), but this seems an extremely variable species.

**Habitat**
In tarns, in open water and associated with *Nostoc* balls on the bottom. June, July, August.

**Stations**
10-r, 30-o, 34-o, B-cc.

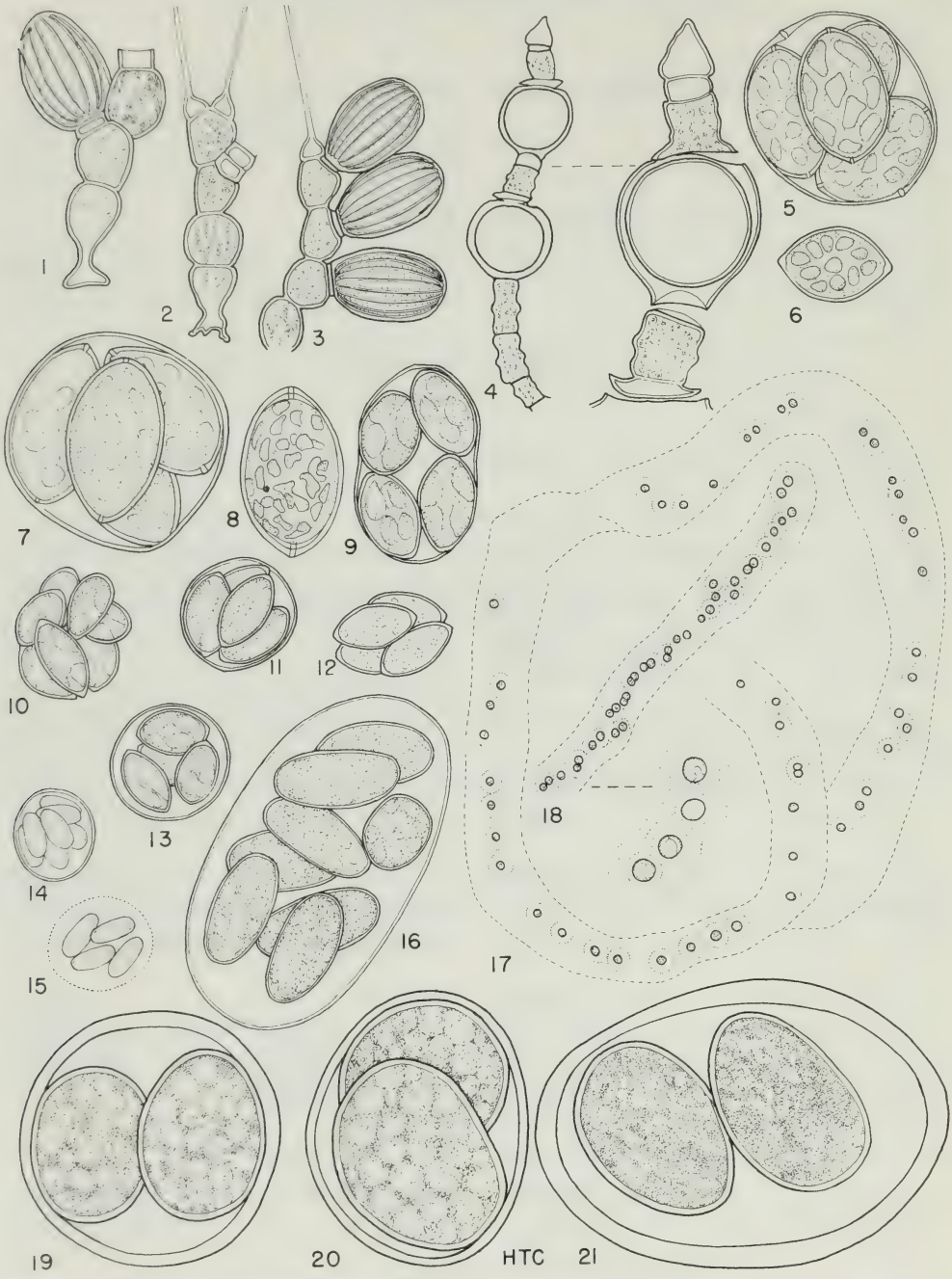
## Oedogoniales

### *BULBOCHAETE* C.A.Agardh 1817

*Bulbochaete nana* Wittr.
Plate VII, figs. 1-3

Vegetative cells 14-18 $\mu$ broad, 16-25 $\mu$ long; oogonia 25-28 $\mu$ broad, 35-40 $\mu$ long; antheridia about 5 $\mu$ broad, 9 $\mu$ long. Monoecious; oogonium ellipsoid, patent, below seta or

## Plate VII



vegetative cell; outer wall of oospore longitudinally ribbed.

**Habitat**
On plant material and in open water of permanent, semipermanent and temporary ponds. June, July.

**Stations**
1-c, 9-c, 18-c, 21A-r, 27-o, 42-r, 43-o, 55-r, 71-r.

*Bulbochaete* spp. (sterile)

**Habitat**
On plant material on bottom, edge and open water of tarns and all sizes of ponds. June, July, August.

**Stations**
3-r, 4-r, 9-rr, 10-o, 13-r, 17-r, 18-r, 21A-r, 21B-o, 21C-r, 28-r, 30-r, 31-r, 32-r, 34-o, 35-r, 36-o, 37-r, 38-r, 39-o, 43-r, 55-o, 77-r, 78-r, A-r, C-r.

## *OEDOGONIUM* Link 1820

*Oedogonium nodulosum* Wittr.
Plate VII, fig. 4

Vegetative cells 15-20 $\mu$ broad, 30-44 $\mu$ long; oogonia 40-50 $\mu$ broad, 40-52 $\mu$ long. Vegetative cells relatively short with 2 undulate constrictions; oogonia mostly globose, operculate, division superior; cospore globose, nearly filling oogonium; wall smooth. Some of the Ellesmere forms are smaller than the dimensions given for the type (vegetative cell 20-29 $\mu$ × 30-140 $\mu$, oogonia 48-57 $\mu$ × 56-73 $\mu$), but Lowe (1923: 32A) reports a form from Herschel Island, Yukon Territory, that is about the same size.

**Habitat**
In squeezings from moss and in open water in permanent and temporary ponds. July.

**Stations**
9-rr, 21A-r, 21B-r, 21C-r, 67-r.

### Plate VII

**Figure**

1-3
*BULBOCHAETE NANA* Wittr. (×425), 49

4
*OEDOGONIUM NODULOSUM* Wittr. (×425, × 850), 51

5,6
*OOCYSTIS SOLITARIA* Wittr. var. *SOLITARIA* (× 640), 59

7,8
*OOCYSTIS SOLITARIA* Wittr. var. *MAJOR* Wille (× 640), 59

9-13
*OOCYSTIS LACUSTRIS* Chod. (× 640), 58

14,15
*OOCYSTIS PUSILLA* Hansg. (× 640), 59

16
*OOCYSTIS ELLIPTICA* W. West (× 640), 58

17,18
*PALMODICTYON VIRIDE* Kütz (17, 18 × 215; 18 × 640), 52

19-21
*OONEPHRIS OBESA* (W. West) Fott (× 640), 59

*Oedogonium* spp. (sterile)

**Habitat**
Attached to vegetation, in all situations in all tarns, all sizes of ponds and a stream. June, July, August.

**Stations**
1-c, 2-r, 3-o, 4-c, 5-c, 9-c, 10-cc, 11-r, 12-c, 13-c, 17-c, 18-c, 19-cc, 21A-cc, 21B-c, 21C-c, 25-r, 27-cc, 28-o, 30-c, 31-c, 32-o, 33-o, 34-cc, 35-o, 36-o, 37-o, 38-cc, 39-c, 42-o, 43-o, 50-r, 51-r, 54-r, 55-c, 71-r, 76-r, 77-r, 78-o, 79-r, 79A-o, 80-o, 83-o, B-o.

## Chlorococcales

### *CHARACIUM* A. Braun in Kützing 1849

*Characium ornithocephalum* A. Braun morpha
Plate IX, figs. 30, 31

Cells 10 $\mu$ broad, 33 $\mu$ long, strongly curved. Body set at nearly right angles to stalk, dorsal margin very convex, ventral margin straight, stalk about half as long as cell, ending in nodule. Cells more slender than type with stalk and beak less sharply differentiated from body. The Ellesmere plant resembles var. *harpochytridiforme* Printz (1914: 39, pl. II, figs. 34-39) in its strong curvature, but is stouter, with stouter stalk. It resembles var. *adolescens* Printz (1914: 39, pl. II, figs. 40-51) in the fact that its stout stalk terminates in a nodule, but it is much larger.

**Habitat**
Attached to larger algae in bottom of permanent pond. July.

**Station**
18-r.

### *PALMODICTYON* Kützing 1845

*Palmodictyon viride* Kütz.
Plate VII, figs. 17, 18

Cells 5-9 $\mu$ broad, tube 14-36 $\mu$ broad. Colonies irregularly branched gelatinous tubes containing spherical cells irregularly arranged in single or double series, each cell or pair of cells surrounded by a separate sheath; chloroplast parietal, lobed. The treating of *Palmodictyon* under Chlorococcales rather than Tetrasporales follows the example of Bourrelly (1966: 158).

**Habitat**
In open water of a permanent and temporary pond. July, August.

**Stations**
9-r, 55-r.

## *PEDIASTRUM* Meyen 1829

**Key to the species found on Ellesmere Island**

1 Marginal cells ending in paired processes as long as the body of the cell or longer ..... 2
1 Marginal cells entire or with short, knob-like processes ..... *P. integrum*
2 Processes diverging, space between pairs as broad as space between processes of adjacent cells ..... *P. boryanum*
2 Processes parallel, space between pairs very narrow ..... *P. tetras*

*Pediastrum boryanum* (Turp.) Menegh. var. *boryanum*
Plate VIII, figs. 1, 2

Central cells 5-10 $\mu$ broad; marginal cells larger, with processes, 10-16 $\mu$ diameter; processes 4-6 $\mu$ long, mostly irregular. Colonies 70-148 $\mu$ × 90-152 $\mu$, not perforate; processes of marginal cells approximately equidistant from each other and from neighbouring processes; wall punctate or granular, processes smooth.

**Habitat**
Mostly in open water but occasionally in squeezings from mosses of tarns and ponds. July, August.

**Stations**
1-o, 10-c, 13-r, 30-cc, 39-c, 78-r, 79-r.

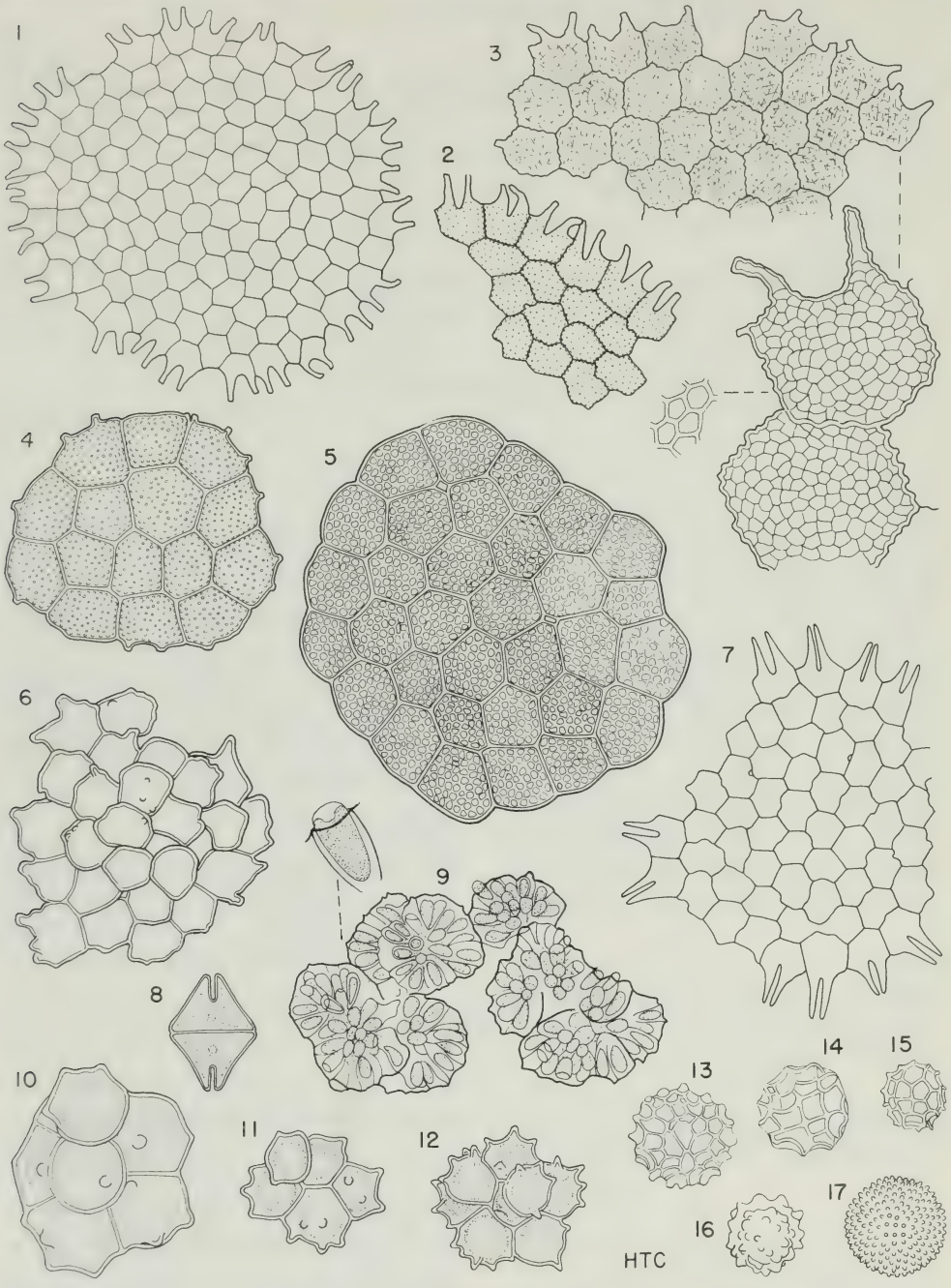
*Pediastrum boryanum* (Turp.) Menegh. var. **ellesmerense** var. n.
Plate VIII, fig. 3

*Cellulae sine processibus 30-38 $\mu$ lat., coloniae 100-320 $\mu$ lat. Varietas differens ut coloniae magnae, ex usque 128 cellulis magnis compositae, membrane rugis crassis reticulata, processus breves irregulares. Plantae magnitudine var.* longicorni *satis similes, differentes, autem, quod membrana reticulata et processus breves et ad apices non distentes. Specimen typicum in aqua patente stagni num. 39 dicti, d. 22, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 68-39-85a, isotype presumably in vial No. A85; both deposited in the National Museum of Natural Sciences, Ottawa.

Cells 30-38 $\mu$ broad; colonies 100-320 $\mu$ broad, composed of up to 128 cells. Wall reticulate with thick ridges, processes short and irregular. A variety differing in its larger cell and colony size, strongly sculptured wall and short, very irregular processes. In its larger size the Ellesmere variety resembles var. *longicorne* Raciborski but differs in the processes, which are short and not swollen at apex. Also, in var. *longicorne* Racib. the wall is described as smooth or granulate, while in the Ellesmere form the wall is reticulate.

## Plate VIII



**Habitat**
In squeezings from moss and in open water of tarns and permanent ponds. July, August.

**Stations**
5-r, 10-c, 30-o, 31-r, 39-cc.

---

*Pediastrum integrum* Näg.
Plate VIII, fig. 4

Cells 12-17 $\mu$ broad, colonies 50 $\mu$ × 55 $\mu$. Colonies 15-celled, entire; cells mostly 5-sided with granular walls, marginal cells with few short blunt processes. It seems probable, as Troitzkaja (1933: 217) proposes, that *P. integrum* and its varieties are merely growth forms of *P. boryanum*.

**Habitat**
In squeezings from moss at edge of permanent pond. July.

**Station**
17-r.

*Pediastrum integrum* Näg. morpha 1
Plate VIII, fig. 5

Cells 12-15 $\mu$ × 15-17 $\mu$, colonies 80 $\mu$ × 85 $\mu$. Cells in a flat plate, with very rare intercellular spaces and no processes; surface of wall obscurely reticulate. In outline like var. *scutum* Racib. (Pascher 1915: 92, fig. 51c) but wall with low reticulations rather than sharp granules.

**Habitat**
In open water of tarn. July.

**Station**
10-r.

---

*Pediastrum integrum* Näg. morpha 2
Plate VIII, fig. 6

Cells 10-12 $\mu$ broad; colonies 60-100 $\mu$ broad, composed of up to 64 cells. Colonies very irregular, cells piled to 3 layers in places; processes sparse, blunt and irregular; wall granular.

---

## Plate VIII

**Figure**

1,2
*PEDIASTRUM BORYANUM* (Turp.) Menegh. var. *BORYANUM* (1×425,2×640), 53

3
*PEDIASTRUM BORYANUM* (Turp). Menegh, var. **ELLESMERENSE** var. n. (×640, ×1920,X5750), 53

4
*PEDIASTRUM INTEGRUM* Näg. (×640), 53

5
*PEDIASTRUM INTEGRUM* Näg. morpha 1 (×640), 55

6
*PEDIASTRUM INTEGRUM* Näg. morpha 2 (×640), 55

7
*PEDIASTRUM TETRAS* (Ehrenb.) Ralfs morpha (×640), 56

8
*EUASTROPSIS RICHTERI* (Schmidle) Lagerh. (×960), 56

9
*BOTRYOCOCCUS BRAUNII* Kütz. (×425,×1275), 57

10-12
*COELASTRUM PRINTZII* Rayss (×640), 56

13-15
*TROCHISCIA RETICULARIS* (Reinsch) Hansg. (×640), 57

16
*TROCHISCIA PACHYDERMA* (Reinsch) Hansg. (×640), 57

17
*TROCHISCIA GRANULATA* (Reinsch) Hansg. (×640), 57

**Habitat**
In squeezings from moss at edge of permanent ponds, and on bottom. July.

**Stations**
17-rr, 31-r.

---

*Pediastrum tetras* (Ehrenb.) Ralfs morpha
Plate VIII, fig. 7

Cells c. 10 $\mu$ broad not including processes, processes c. 6 $\mu$ long; colonies of 64 cells 70 $\mu$ × 80 $\mu$. The colony resembles the *P. tetras* colony in that the narrow incision of the marginal cells between the relatively long processes brings the two processes from one cell much closer to each other than to the processes of the neighbouring cells (as emphasized by Bigeard 1933). It differs from the type in the greater number of cells in the colony.

**Habitat**
In squeezings from moss at edge of tarn. July.

**Station**
10-r.

---

## *EUASTROPSIS* Lagerheim 1895

*Euastropsis richteri* (Schmidle) Lagerh.
Plate VIII, fig. 8

Cells 7.5 $\mu$ × 11 $\mu$, colonies 11 $\mu$ × 15 $\mu$. Colonies consist of 2 somewhat triangular cells, joined at their bases, their apices deeply notched.

**Habitat**
With other algae in a permanent pond. July.

**Station**
21A-rr.

---

## *COELASTRUM* Nägeli in Kützing 1849

*Coelastrum printzii* Rayss 1915: 56, figs. A 1-12
Plate VIII, figs. 10-12

Cells 10-15 $\mu$ × 11-18 $\mu$, colonies 22-40 $\mu$ × 25-47 $\mu$. Small colony of closely packed, somewhat polygonal cells, each bearing 1 to 8 irregular, rounded protuberances.

**Habitat**
In squeezings from moss at edge and bottom of permanent and semipermanent ponds, and once from open water of a tarn. July, August.

**Stations**
12-rr, 21A-r, 31-r, 42-rr.

---

## *BOTRYOCOCCUS* Kützing 1849

*Botryococcus braunii* Kütz.
Plate VIII, fig. 9

Cells 4-5 $\mu$ × 8-10 $\mu$, colonies 30-50 $\mu$ × 30-60 $\mu$. Cells ovoid, in an irregular, somewhat globose colony encased in a heavy, often dark-coloured mucilage.

**Habitat**
Generally distributed in the plankton of all tarns and in all sizes of ponds. June, July, August.

**Stations**
1-r, 9-o, 10-r, 12-cc, 13-c, 17-o, 18-o, 19-r, 21A-o, 21C-o, 27-r, 28-r, 30-c, 31-r, 32-o, 33-r, 34-r, 35-r, 36-r, 37-r, 38-c, 39-r, 42-r, 43-r, 54-r, 55-cc, 76-o, 77-r, 78-r.

## *TROCHISCIA* Kützing 1833

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cell surface covered with granules or protuberances ..... | 2 |
| 1 | Cell surface reticulate ..... | *T. reticularis* |
| 2 | Cell surface covered with granules ..... | *T. granulata* |
| 2 | Cell surface covered with rounded protuberances ..... | *T. pachyderma* |

*Trochiscia granulata* (Reinsch) Hansgirg
Plate VIII, fig. 17

Cell 21 $\mu$ in diameter, spherical, the wall densely covered with rounded granules.

**Habitat**
In a little bay at the northwest shore of a tarn. August.

**Station**
10-rr.

*Trochiscia pachyderma* (Reinsch) Hansg.
Plate VIII, fig. 16

Cell 17 $\mu$ in diameter, spherical, the wall very thick, with rounded protuberances.

**Habitat**
In squeezings from moss at edge of a temporary pond. July.

**Station**
80-rr.

*Trochiscia reticularis* (Reinsch) Hansg.
Plate VIII, figs. 13-15

Cells 15-40 $\mu$ in diameter, spherical, the wall ornamented with ridges forming a reticulum with 15 to 35 visible areas.

**Habitat**
In squeezings from moss, and less commonly in open water of tarns and of permanent and semipermanent ponds; by far the commonest *Trochiscia* species in the collections. July, August.

**Stations**
10-o, 11-rr, 18-cc, 19-r, 28-r, 30-r, 32-c, 33-r, 35-r, 36-r, 39-cc, 42-r.

## *OOCYSTIS* Nägeli in A. Braun 1855

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells ovate, with nodule or thickening at poles | 2 |
| 1 | Cells ellipsoid, without nodule or thickening at poles | 3 |
| 2 | Cells less than 14 $\mu$ broad, poles pointed and slightly thickened, chloroplasts 1 to 4 | *O. lacustris* |
| 2 | Cells 14 $\mu$ or more broad, nodule with pore at pole, chloroplasts numerous | *O. solitaria* |
| 3 | Cells very small, less than 6 $\mu$ broad | *O. pusilla* |
| 3 | Cells larger, 7 $\mu$ or more broad | *O. elliptica* |

*Oocystis elliptica* W. West
Plate VII, fig. 16

Cells 9-13 $\mu$ × 20-30 $\mu$ (2-2.4 ×). Cells in fours, rarely in twos, in wall of old mother-cell; cells ellipsoid with broadly rounded ends, chloroplasts numerous, pyrenoids uncertain. Some plants were more slender and longer than accepted dimensions for the species, but all were very characteristic in their elliptic form and in number of chloroplasts.

**Habitat**
In squeezings from moss at edge and bottom of permanent ponds. July, August.

**Stations**
17-r, 18-r, 19-c, 28-r, 38-r, 79-rr.

*Oocystis lacustris* Chod.
Plate VII, figs. 9-13

Cells 7-12 $\mu$ × 12-22 $\mu$ (1.4-2.2 ×). Poles of cells pointed and often slightly thickened, chloroplasts 1 to 4, mother-cell wall not always evident.

**Habitat**
In squeezings from moss and in open water of tarns and of permanent and semipermanent ponds, and in a stream; the commonest species of *Oocystis* in the collections. July, August.

**Stations**
1-r, 3-rr, 10A-r, 12-rr, 13-o, 18-o, 28-o, 31-c, 32-r, 33-r, 34-o, 36-r, 38-r, 39-r, 71-r.

*Oocystis pusilla* Hansg.
Plate VII, figs. 14, 15

Cells 4-5.5 $\mu$ × 9-10 $\mu$ (1.8-2.5 ×). Cells in fours or eights, ovate, ends rounded without nodular thickening; chloroplasts 1 or 2, pyrenoids seen only once. In one case (fig. 15) the 4 daughter cells were surrounded by a clear area but not by a wall.

**Habitat**
In squeezings from moss at edge and bottom of permanent ponds. July.

**Stations**
28-o, 31-r.

---

*Oocystis solitaria* Wittr. var. *solitaria*
Plate VII, figs. 5, 6

Cells 14-18 $\mu$ × 18-31 $\mu$ (1.6-2.2 ×). Cells mostly solitary or in twos, fours or eights, ovate with rather pointed and thickened poles, usually showing a pore; chloroplasts numerous, usually each with a pyrenoid.

**Habitat**
In squeezings from moss at edge and bottom of tarns and mostly permanent ponds, also in open water and on bottom. July, August.

**Stations**
19-r, 21C-r, 31-o, 34-o, 35-r, 36-r, 37-o, 39-r, 78-r.

---

*Oocystis solitaria* Wittr. var. *major* Wille
Plate VII, figs. 7,8

Cells 20-24 (31) $\mu$ × 32-39 (48) $\mu$ (1.4-2.2 ×). Cells mostly solitary, rarely in fours, broadly to narrowly ovate with nodular thickening at poles, usually with a pore. Chloroplasts numerous, pyrenoid not always noticeable in preserved material.

**Habitat**
In squeezings from moss at edge and in open water of a tarn and mostly permanent ponds. July, August.

**Stations**
5-r, 18-rr, 34-r, 37-o, 39-r, 78-r.

---

## *OONEPHRIS* Fott 1964

*Oonephris obesa* (W. West) Fott 1964: 133, figs. 1-6
Plate VII, figs. 19-21

Cells 18-40 $\mu$ × 29-55 $\mu$ (1.3-2 ×), colonies 42-112 $\mu$ × 48-112 $\mu$. Cells and mother cells *Oocystis*- or *Nephrocytium*-like: ellipsoid or, more commonly, slightly kidney-shaped, living as autospores for a long time in the enlarged mother-cell walls. Walls of cells and mother cells very thick and firm, without polar thickening; chloroplast spongiform, with one central pyrenoid, difficult to see through the dense chloroplast. The plants studied extend the size range given by Fott (1964: 134).

**Habitat**
In squeezings from moss at edge and bottom, also in open water of all

tarns, most permanent ponds, 2 temporary ponds and a seepage area; very common. July, August.

**Stations**

1-o, 3-o, 5-o, 6-o, 9-o, 10-o, 12-r, 13-r, 17-o, 18-r, 19-c, 21C-r, 28-r, 30-r, 31-o, 34-o, 35-r, 36-r, 37-o, 38-o, 39-c, 78-r, 79-cc, A-r.

## *ANKISTRODESMUS* Corda 1838

**Key to the species found on Ellesmere Island**

1 Cells narrow, lunate, not encased in jelly ..... *A. falcatus*
1 Cells broad, fusiform, in jelly tube ..... *A. gelifactus*

*Ankistrodesmus falcatus* (Corda) Ralfs
Plate IX, figs. 34-38

Cells 2-3 $\mu$ × 27-50 $\mu$, needle-like to spindle-shaped, somewhat lunately curved, solitary or in clusters without colonial sheath; chloroplast parietal, without pyrenoid.

**Habitat**

Generally distributed throughout nearly all tarns and all sizes of ponds and a creek. June, July, August.

**Stations**

1-o, 4-r, 5-r, 6-c, 9-r, 11-rr, 12-r, 13-r, 17-rr, 18-o, 19-c, 21A-c, 21C-r, 28-r, 30-o, 31-c, 32-o, 34-r, 35-r, 36-o, 38-o, 39-r, 42-r, 50-r, 55-r, 78-r, 79-r, 79A-o.

*Ankistrodesmus falcatus* (Corda) Ralfs f. *dulcis* (Playfair) Nygaard 1945: 52, pl. IV, fig. 44
Plate IX, fig. 39

Cells 2.8 $\mu$ × 27 $\mu$ (chord of arc), evenly curved into a semicircle.

**Habitat**

In moss squeezings from edge of permanent pond. July.

**Station**

21A-rr.

*Ankistrodesmus gelifactus* (Chod.) Bourrelly 1951: 679, fig. 20 *(Raphidium pyrenogerum* Chod.)
Plate IX, figs. 32, 33

Cells 3-3.5 $\mu$ × 19-21 $\mu$, fusiform, acute, in colonies of 2 cells, end to end in a rather narrow gelatinous sheath; pyrenoid not seen.

**Habitat**

With other algae in a tarn and a permanent pond. July.

**Stations**

21A-rr, 34-r.

## *TETRAËDRON* Kützing 1845

**Key to the species found on Ellesmere Island**

1 Cells 5-angled in face view, one side more concave than the others ..... *T. caudatum*
1 Cells 3-4-angled in face view ..... 2
2 Cells 3-angled ..... *T. trigonum*
2 Cells 4-angled ..... *T. minimum*

*Tetraëdron caudatum* (Corda) Hansg.
Plate IX, fig. 43

Cells c. 14 $\mu$ broad, flattened, irregularly 5-angled, each angle tipped with a papilla, the sides between the angles concave, one side more deeply concave than the others.

**Habitat**
In squeezings from moss at edge of a semipermanent pond. July.
**Station**
32-rr.

*Tetraëdron minimum* (A. Braun) Hansg.
Plate IX, fig. 40

Cells c. 12 $\mu$, irregularly flattened and 4-angled, the angles rounded, the sides concave.

**Habitat**
In squeezings from moss at edge of temporary pond. July.
**Station**
27-r.

*Tetraëdron minimum* (A. Braun) Hansg. morpha
Plate IX, figs. 41, 42

Cells 11-13 $\mu$ × 12-16 $\mu$, flattened with 2 opposite sides more deeply incised than the other 2, each angle bearing a small papilla. These plants superficially resemble a species of *Staurodesmus* Teiling, but differ in greater asymmetry and in having a single laminate chloroplast. They approach Skuja's *T. regulare* Kütz. var. *incus* Teil. forma, which he says might belong to the *T. minimum* group (Skuja 1956: 177, pl. 28, figs. 17, 18). With this I agree.

**Habitat**
In squeezings from moss near edge of a permanent pond. July.
**Station**
78-c.

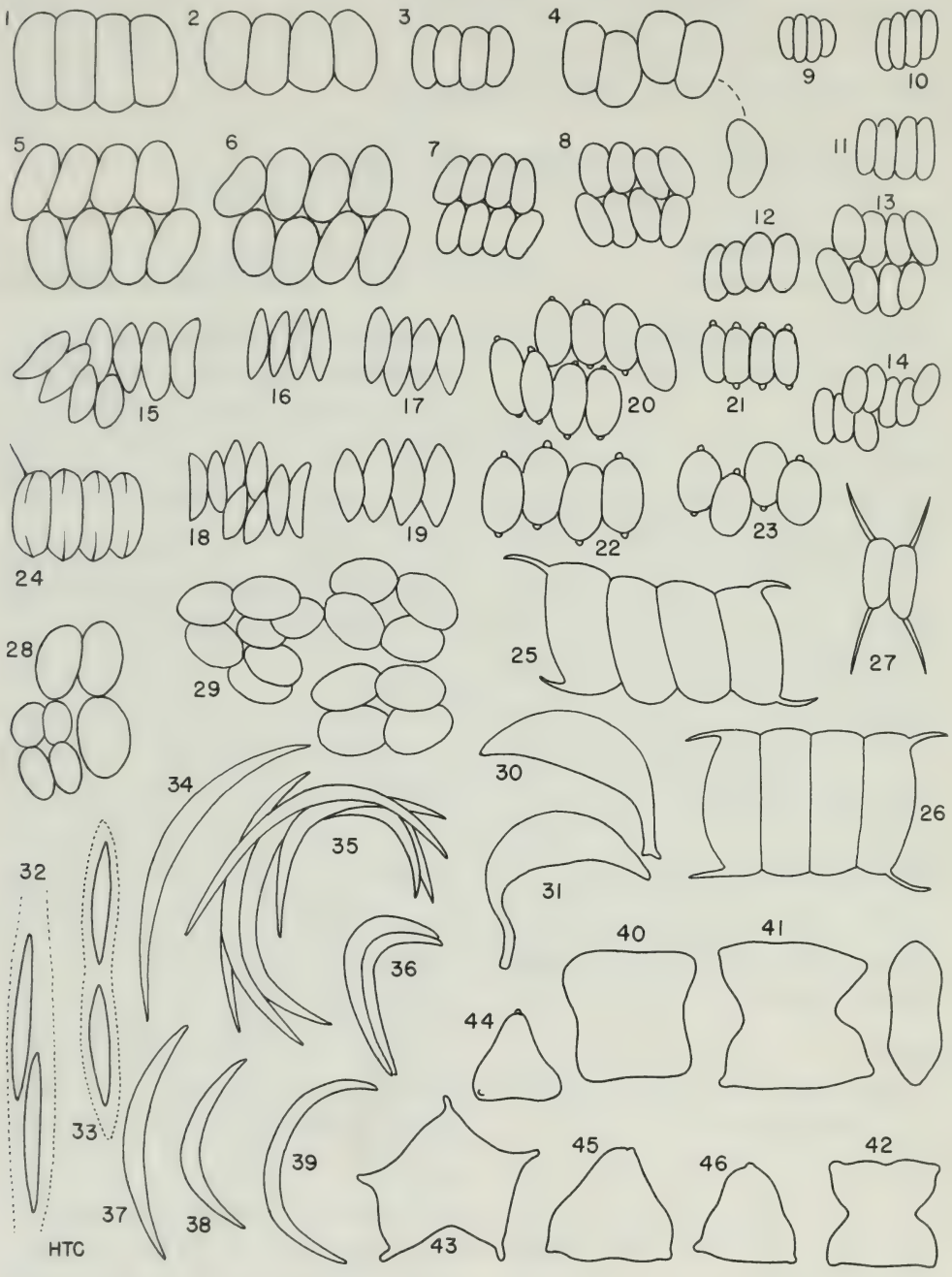
*Tetraëdron trigonum* (Näg.) Hansg. var. *papilliferum* (Schroeder) Lemmerm. ex Brunnthaler morpha
Plate IX, figs. 44-46

Cells 9-13 $\mu$ broad, flattened, triangular, the angles rounded and bearing a tiny papilla, the sides slightly concave. Smaller than type.

**Habitat**
In squeezings from moss at edge of permanent ponds, rarely in open water; the commonest species of *Tatraëdron* in the collections. July, August.

**Stations**
3-r, 4-r, 13-r, 18-c, 28-c, 33-c, 38-c.

Plate IX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## *SCENEDESMUS* Meyen 1829

The identification of all the following species of *Scenedesmus* must be considered as tentative in view of the work of Trainor during the last decade (Trainor and Rowland 1968, and earlier papers). The species names used are those accepted by Chodat 1926.

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells without spines or other ornamentation | 2 |
| 1 | Cells with spine and/or other ornamentation | 5 |
| 2 | Cells fusiform, abruptly tapered to a point | *S. obliquus* |
| 2 | Cells ovoid or elliptic with rounded ends | 3 |
| 3 | Colonies of 4 to 8 broadly ovoid cells arranged in a curved plate | *S. arcuatus* |
| 3 | Colonies of 4 or 8 cells arranged in a flat plate | 4 |
| 4 | Cells narrow, more than 3 times as long as broad | *S. ecornis* |
| 4 | Cells broadly ovoid | *S. bijugatus* |

**Plate IX**

**Figure**

1-8
*SCENEDESMUS BIJUGATUS* (Turp.) Kütz. (×730), 64

9-11
*SCENEDESMUS ECORNIS* (Ralfs) Chod. (×730), 65

12-14
*SCENEDESMUS ARCUATUS* Lemmerm. (×730), 64

15-19
*SCENEDESMUS OBLIQUUS* (Turp.) Kütz. (×730), 65

20-23
*SCENEDESMUS APICULATUS* (West and West) Chod (×730), 64

24
*SCENEDESMUS ARMATUS* (Chod.) G.M. Smith (×730), 64

25-27
*SCENEDESMUS QUADRICAUDA* Ehrenb. (×730), 65

28,29
*CRUCIGENIA RECTANGULARIS* (A. Braun) Gay (×730), 65

30,31
*CHARACIUM ORNITHOCEPHALUM* A. Braun morpha (×730), 52

32,33
*ANKISTRODESMUS GELIFACTUS* (Chod.) Bourrelly (×730), 60

34-38
*ANKISTRODESMUS FALCATUS* (Corda) Ralfs (×730), 60

39
*ANKISTRODESMUS FALCATUS* (Corda) Ralfs f. *DULCIS* (Playf.) Nygaard (×730), 60

40
*TETRAËDRON MINIMUM* (A. Braun) Hansg. (×1070), 61

41,42
*TETRAËDRON MINIMUM* (A. Braun) Hansg. morpha (×1070), 61

43
*TETRAËDRON CAUDATUM* (Corda) Hansg. (×1070), 61

44-46
*TETRAËDRON TRIGONUM* (Näg.) Hansg. var. *PAPILLIFERUM* (Schroed.) Lemmerm. ex Brunnth. morpha (×1070), 61

5 Cells with spine only at corner of outer cells *S. quadricauda*
5 Cells ornamented otherwise ..... 6
6 Cells with little knob at ends of all cells *S. apiculatus*
6 Cells with an occasional spine at corners of outer cells, and with an incomplete ridge extending vertically across middle of cells ..... *S. armatus*

---

*Scenedesmus apiculatus* (West and West) Chod.
Plate IX, figs. 20-23

Cells 4-6 $\mu$ × 10-14 $\mu$; colonies of 4 cells in a single or slightly alternating series, or of 8 cells in a double alternating series. Cells ovate or oblong with one or, more frequently, both ends bearing a papilla.

**Habitat**
In squeezings from moss or in drifting mat of algae in permanent ponds. July, August.

**Stations**
5-r, 21A-o, 28-o, 31-r, 33-rr, 38-o.

---

*Scenedesmus arcuatus* Lemmerm.
Plate IX, figs. 12-14

Cells 3-5 $\mu$ × 8-13 $\mu$ (a little smaller than the dimensions given by Chodat 1926: 168, which are 5-9 $\mu$ × 9-15 $\mu$). Colonies of 8, rarely 4, cells, the 8-celled colonies with cells arranged in a regular or irregular double row, forming a slightly curved disc; cells ovate or oblong with rounded ends. This occurred with *S. bijugatus,* distinguishable from this species only by the fact that the disc of cells is slightly curved, not flat; this species should probably be classified with it.

**Habitat**
In squeezings from moss at edge, also once in bottom material from permanent ponds and a tarn. July, August.

**Stations**
18-o, 19-r, 28-r, 30-r.

---

*Scenedesmus armatus* (Chod.) G.M. Smith
Plate IX, fig. 24

Cells 3-5 $\mu$ × 9-12 $\mu$; colonies in Ellesmere material were of 4 cells in a single series. Cells ovate or oblong, bearing a complete or incomplete ridge extending lengthwise across the middle of each cell, corners of exterior cells sometimes bearing a fragile, curved spine.

**Habitat**
In squeezings from moss at edge of permanent ponds and a tarn. July.

**Stations**
1-rr, 4-r, 12-rr, 18-r.

---

*Scenedesmus bijugatus* (Turp.) Kütz.
Plate IX, figs. 1-8

Cells 3-8 $\mu$ × 7-20 $\mu$ (1.6-2.6 ×); colonies flat, composed of 4 cells in a single series or of 8 cells in a tightly packed double series. Cells broadly oval, rarely slightly reniform in plane of disc, all alike, with rounded ends.

**Habitat**
In squeezings from moss and in open water in mostly permanent ponds. July, August.

**Stations**
1-r, 13-rr, 17-rr, 18-rr, 19-c, 21A-r, 27-r, 28-cc, 31-r, 38-r, B-r.

---

*Scenedesmus ecornis* (Ralfs) Chod.
Plate IX, figs. 9-11

Cells 2.3-3.2 $\mu$ × 7-10 $\mu$ (3.1-3.6×); flat colonies of 4 cells in a single series, cells narrowly oval with rounded ends. This species differs from *S. bijugatus* in its smaller, narrower cells, the outer ones sometimes smaller than the centre ones. It would seem appropriate to unite *S. arcuatus, S. bijugatus* and *S. ecornis* and their varieties into one species, or even into a spineless variety of *S. quadricauda* (Trainor 1964).

**Habitat**
In squeezings from moss and in open water of permanent ponds and a tarn. July, August.

**Stations**
4-r, 5-o, 21A-o, 30-o, 33-o, 38-c.

---

*Scenedesmus obliquus* (Turp.) Kütz.
Plate IX, figs. 15-19
Cells 3.2-4.8 $\mu$ × 11-14 $\mu$. Flat colonies composed of 4, rarely 8, fusiform cells, the 4-celled colonies in a single series, the 8-celled ones somewhat irregular; apices of cells abruptly tapered, sometimes somewhat apiculate. This species is interpreted in the broad sense of Chodat (1926: 113) as a "collective species".

**Habitat**
In squeezings from moss at edge and bottom of mostly permanent ponds. July.

**Stations**
5-o, 21A-r, 28-o, 31-o, 32-rr.

---

*Scenedesmus quadricauda* Ehrenb.
Plate IX, figs. 25-27

Cells 4-9 $\mu$ × 11-22 $\mu$, spines 4-8 $\mu$. Flat colonies composed of 2 to 8 cylindrical-ovoid cells with broadly rounded poles, the outer cells bearing a single spine. This species is interpreted in the broad sense of Chodat (1926: 226) as a "collective species". In the material studied it was surprisingly rare, and seen in two very different forms.

**Habitat**
In squeezings from moss at edge of permanent ponds and a tarn. July, August.

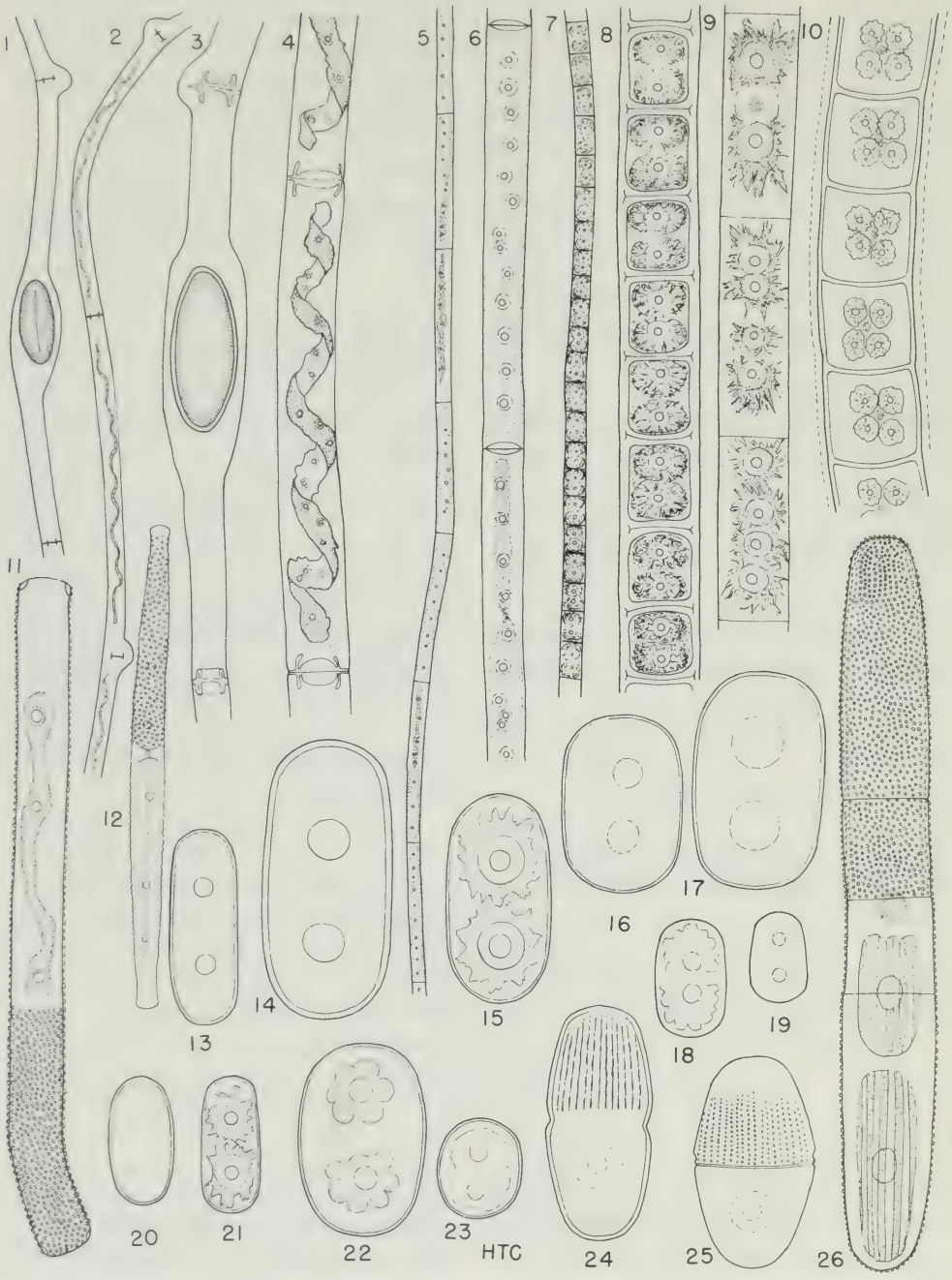
**Stations**
5-rr, 34-r, B-r.

---

## *CRUCIGENIA* Morren 1830

*Crucigenia rectangularis* (A. Braun) Gay (including var. *irregularis* (Wille) Brunnth.)
Plate IX, figs. 28, 29

Cells 4-6 $\mu$ × 9-12 $\mu$; colonies of broadly ovate cells in fours or groups of fours, quadrately arranged around a very small central space, forming an irregular flat disc. Since all variations were observed between a very regular quadrate arrangement of cells and an irregular arrangement only suggesting it, I agree with Skuja (1964: 139) that *C. irregularis* Wille or *C. rectangularis* var. *irregularis* (Wille) Brunnth. should not be maintained as a separate taxon.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**Habitat**
In open water and in squeezings from mosses at edge and bottom of tarns and permanent ponds. July, August.

**Stations**
12-r, 13-r, 17-r, 18-r, 28-o, 30-r.

## Zygnematales

### *SPIROGYRA* Link 1820

*Spirogyra groenlandica* Rosenvinge
Plate X, figs. 1-4

Cells 20-25 $\mu$ × 380-580 $\mu$ (19-23×), zygospore 32-48 $\mu$ × 70-100 $\mu$ (2-2.7 ×). Vegetative cells very long, with replicate cross-walls; conjugation lateral, fertile cells quadrately much swollen, zygospore dark bright brown, sometimes with longitudinal median "cleft".

**Habitat**
In open water of ponds and lake. July.

**Stations**
9-cc, 34-r, 35-r, 37-r, 43-cc, A-r.

*Spirogyra* spp. (sterile)

**Habitat**
Among mosses and on bottom of ponds and lakes; much less common than *Mougeotia* or *Zygnema*. June, July, August.

**Stations**
10-r, 17-rr, 34-r, 35-r, 36-r, 50-cc.

## Plate X

**Figure**

1-4
*SPIROGYRA GROENLANDICA* Rosenv. (1, 2 × 105, 3 × 215, 4 × 425), 67

5,6
*MOUGEOTIA* spp. (5 × 105, 6 × 425), 68

7-10
*ZYGNEMA* spp. (7 × 105, 8-10 × 425), 68

11
*GONATOZYGON MONOTAENIUM* de Bary (×640), 69

12
*GONATOZYGON BREBISSONII* de Bary (×640), 68

13-15
*CYLINDROCYSTIS BREBISSONII* (Ralfs) de Bary var. *BREBISSONII* (×640), 69

16,17
*CYLINDROCYSTIS BREBISSONII* (Ralfs) de Bary var. *TURGIDA* Schmidle (×640), 69

18,19
*CYLINDROCYSTIS BREBISSONII* (Ralfs) de Bary var. *TURGIDA* Schmidle morpha (×640), 70

20,21
*CYLINDROCYSTIS BREBISSONII* (Ralfs) de Bary var. *MINOR* West and West (×640), 69

22
*CYLINDROCYSTIS CRASSA* de Bary var. *CRASSA* (×640), 70

23
*CYLINDROCYSTIS CRASSA* de Bary var. *ELLIPTICA* West and West (×640), 70

24
*PENIUM SILVAE NIGRAE* Raban. (×640), 71

25
*PENIUM SILVAE NIGRAE* Raban. morpha ad f. *MINUS* (×640), 71

26
*PENIUM MARGARITACEUM* (Ehrenb.) Bréb. (×425), 70

## *MOUGEOTIA* (C.A.Agardh) Wittrock 1872

*Mougeotia* spp. (sterile)
Plate X, figs. 5, 6

**Habitat**
Generally distributed in all bodies of water; the commonest genus of the Zygnematales. June, July, August, September.

**Stations**
1-r, 3-o, 4-o, 5-o, 9-c, 10-r, 12-o, 13-o, 18-o, 19-o, 21A-c, 21B-o, 21C-c, 27-o, 28-o, 30-o, 31-c, 34-c, 35-o, 35A-r, 36-o, 37-r, 38-o, 39-r, 49A-r, 55-r, 71-r, 78-r, 79A-r, A-r, C-r, E-c (Whelden 1947: 59).

## *ZYGNEMA* C.A.Agardh 1817

*Zygnema* spp. (sterile)
Plate X, figs. 7-10

The commonest species had short cells with 2 very dense chloroplasts (figs. 7, 8), and sometimes a wide, dark sheath. In some forms (fig. 9) the cells were long, with 4 chloroplasts in a single row (pre-division?). In one form (fig. 10), found only in 1962, there were 4 chloroplasts arranged in a quadrate around the central nucleus (tetraploidy?).

**Habitat**
Generally distributed in tarns, ponds and smaller bodies of water; more common than *Spirogyra,* less common than *Mougeotia.* June, July, August, September.

**Stations**
1-o, 3-cc, 4-r, 5-cc, 9-r, 10-cc, 12-c, 13-r, 18-o, 19-r, 21A-o, 21B-r, 27-o, 28-r, 31-r, 32-r, 33-r, 34-cc, 36-r, 37-r, 39-r, 42-r, 49-cc, 50-cc, 83-r, A-cc, D-cc, E-c (Whelden 1947: 110).

## *GONATOZYGON* de Bary 1856

**Key to the species found on Ellesmere Island**

1 Cells cylindrical, not tapering ..... *G. monotaenium*
1 Cells tapering from middle, with broader ends ..... *G. brebissonii*

*Gonatozygon brebissonii* de Bary
Plate X, fig. 12

Cells 105-130 (288) $\mu$ × 7-7.5 (10.8) $\mu$ (15-17.3 (40) ×), apex 4-5 $\mu$. Cells narrowly cylindrical-subfusiform, contracted below the subcapitate apices; wall densely granulate; chloroplasts 1 per cell with 3 to 8 (16) small pyrenoids.

**Habitat**
In squeezings from moss and in open water in tarns. July, August.

**Stations**
12-rr, 35-r, 36-r.

*Gonatozygon monotaenium* de Bary
Plate X, fig. 11

Cells 144-160 (285) $\mu$ × (10) 11-12 $\mu$ (13-28.5 ×), apex 10-12 $\mu$. Cells cylindrical but often bent, apices usually very slightly dilated; wall densely granulate; chloroplasts typically 1 per cell with 4 to 8 (16) large pyrenoids.

**Habitat**
In open water and in squeezings from moss in tarns and a semipermanent pond; rare. July, August.

**Stations**
34-r, 36-r, 76-r.

---

## *CYLINDROCYSTIS* Meneghini 1838

**Key to the species found on Ellesmere Island**

1 Cells short-cylindrical, with parallel sides .... *C. brebissonii*
1 Cells broadly ovate or elliptic, with convex sides ..... *C. crassa*

---

*Cylindrocystis brebissonii* (Ralfs) de Bary var. *brebissonii*
Plate X, figs. 13-15

Cells 30-69 $\mu$ × 13.5-27 $\mu$ (2.1-3.8×). Cells cylindrical with broadly rounded ends and not constricted at isthmus; chloroplast with central, sometimes elongated part and radiating plates; pyrenoids 1, rarely 2, sometimes elongated; wall thin and smooth.

**Habitat**
In all kinds of wet and damp situations; the commonest species of *Cylindrocystis*. July, August.

**Stations**
12-c, 13-rr, 21B-c, 30-r, 39-r, 49A-r, 50A-r, 67-r, 71-r, 79-r, A-cc, D-cc, D-r.

---

*Cylindrocystis brebissonii* (Ralfs) de Bary var. *minor* West and West
Plate X, figs. 20, 21

Cells 28-29 $\mu$ × 12-13.5 $\mu$ (2.1-2.4×), like type but smaller.

**Habitat**
In squeezings from moss at edge of tarn, and between sedge clumps near creek. July.

**Stations**
12-c, 36-r, 50A-r.

---

*Cylindrocystis brebissonii* (Ralfs) de Bary var. *turgida* Schmidle
Plate X, figs. 16, 17

Cells 38-48 $\mu$ × 24-28 $\mu$ (1.45-2 ×), broadly cylindrical, relatively shorter than type, otherwise typical.

**Habitat**
In squeezings from moss at edge and bottom of all sizes of ponds, and from creek. July.

**Stations**
10A-r, 21A-o, 67-r, 71-r, 76-r.

---

*Cylindrocystis brebissonii* (Ralfs) de Bary var. *turgida* Schmidle morpha
Plate X, figs. 18, 19

Cells 17-27 $\mu$ × 12-17 $\mu$ (1.4-2 ×). Cells with parallel sides as in *C. brebissonii,* relatively short as in var. *turgida,* but much smaller than either. In some cases (perhaps young cells?) one end of the cell is broader than the other. This seems to be similar to *C. crassa* de Bary f. *tenuis* Hodgetts (1926: 69, figs. 6A-C), but I agree with Krieger (1937: 210) that because of the parallel sides it is better placed under *C. brebissonii.*

**Habitat**
In squeezings from moss in lake, pond and a creek. July.

**Stations**
12-o, 39-r, 49-r, 50A-r, A-r, D-r.

---

*Cylindrocystis crassa* de Bary var. *crassa*
Plate X, fig. 22

Cells 41 $\mu$ × 27 $\mu$ (1.5 ×), broadly elliptical, sides not parallel.

**Habitat**
In squeezings from moss at edge of semipermanent pond, also in a lake and a creek. July.

**Stations**
71-r, A-r, D-r.

---

*Cylindrocystis crassa* de Bary var. *elliptica* West and West
Plate X, fig. 23

Cells 21-22 $\mu$ × 17.5-18 $\mu$ (1.16-1.28×), small, broadly elliptic.

**Habitat**
On bottom of creek at delta from glacier. July.

**Station**
49-r.

---

## *PENIUM* de Brébisson 1834

**Key to the species found on Ellesmere Island**

1 Cells cylindrical, wall coarsely granulate ..... *P. margaritaceum*
1 Cells ovate, wall finely striate ..... *P. silvae nigrae*

---

*Penium margaritaceum* (Ehrenb.) Bréb.
Plate X, fig. 26

Cells 125-230 $\mu$ × 29-31 $\mu$ (4.7-7.7 (13) ×). Cells cylindrical with distinct constriction at isthmus and usually with girdle-bands; apex rounded; wall usually coloured, closely beset with large granules that are sometimes in more or less longitudinal rows; chloroplast 1 or 2 in each semicell, with 1 or 2 pyrenoids.

**Habitat**
In squeezings from moss at edge of tarns and permanent and semipermanent ponds. July.

**Stations**
10-rr, 32-o, 34-r, 39-r, 42-o.

---

*Penium silvae nigrae* Raban.
Plate X, fig. 24

Cells 50 $\mu$ × 22.5 $\mu$ (2.25 ×). Cells long-ellipsoid, tapering from slightly indented isthmus to rounded apex; wall thick with indistinct, irregularly thickened longitudinal striae; chloroplast with radiating plates and central pyrenoid. This plant is very similar to one found in Labrador (Croasdale and Grönblad 1964: 152, pl. I, fig. 36).

**Habitat**
In squeezings from moss at edge of semipermanent pond. July.

**Station**
42-r.

*Penium silvae nigrae* Raban. morpha ad f. *minus* Bourrelly and Manguin (1952: 217, pl. 27, fig. 469) accedens
Plate X, fig. 25

Cells 43-44 $\mu$ × 24-26 $\mu$ (1.6-1.8 ×). Cells smaller and stouter, and more tapered than type, but larger and more tapered than the Bourrelly and Manguin form. It differs from *P. polymorphum* Perty in its lack of girdlebands and its more widely spaced striae (6 to 8 in 10 $\mu$), which are faint and formed by rows of puncta.

**Habitat**
In squeezings from moss at edge of permanent ponds. July.

**Stations**
33-r, 39-r.

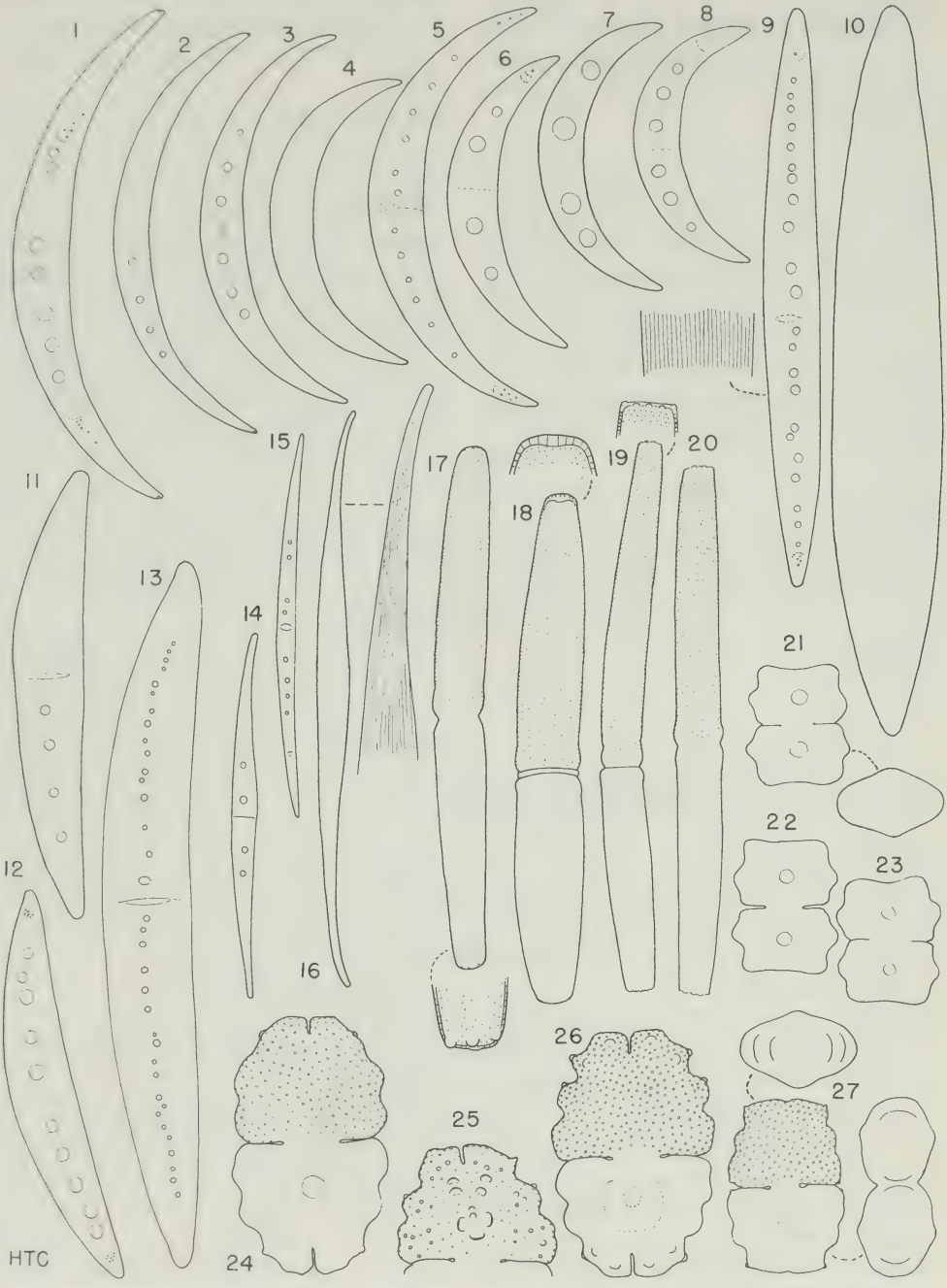
---

## *CLOSTERIUM* Nitzsch 1817

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Cells strongly curved, more than 120 degrees of arc | 2 |
| 1 | Cells only slightly curved, less than 100 degrees of arc | 5 |
| 2 | Cells less than 130 degrees of arc, apex usually thickened | 3 |
| 2 | Cells more than 130 degrees of arc, apex not thickened | 4 |
| 3 | Cells 150 $\mu$ or more long, apex angularly truncate | *C. dianae* |
| 3 | Cells 125-140 $\mu$ long, apex pointed | *C. parvulum* |
| 4 | Cells 10 times as long as broad or longer | *C. parvulum* |
| 4 | Cells less than 10 times as long as broad | *C. venus* |
| 5 | Cells large, more than 200 $\mu$ long | 6 |
| 5 | Cells small, less than 150 $\mu$ long | 10 |
| 6 | Cells more than 420 $\mu$ long | 7 |
| 6 | Cells less than 420 $\mu$ long | 8 |

## Plate XI



7 Cells evenly tapered to rounded apex, pyrenoids scattered ..... *C. lunula*
7 Cells rather abruptly tapered to recurved apex, pyrenoids in one row ..... *C. pritchardianum*
8 Cells unevenly swollen in middle, tapering into slender processes ..... *C. rostratum*
8 Cells evenly swollen and evenly tapered 9
9 Apices rather abruptly tapered and truncate, wall finely striate ..... *C. acerosum*
9 Apices rounded, wall smooth ..... *C. pseudolunula*
10 Cells 20 or more times as long as broad, apices pointed ..... *C. acutum*
10 Cells less than 10 times as long as broad, apices truncately rounded ..... *C. tumidum*

## Plate XI

**Figure**

1
*CLOSTERIUM DIANAE* Ehrenb. (×425), 74

2
*CLOSTERIUM PARVULUM* Näg. (×425), 74

3,4
*CLOSTERIUM VENUS* Kütz. var. *VENUS* (×425), 75

5
*CLOSTERIUM VENUS* Kütz. var. *APOLLONIONIS* Croasd. (×425), 75

6-8
*CLOSTERIUM VENUS* Kütz. var. *CRASSUM* Croasd. (×425), 76

9
*CLOSTERIUM ACEROSUM* (Schrank) Ehrenb. (×215, ×860), 74

10
*CLOSTERIUM ?LUNULA* (Müll.) Nitzsch (×215), 74

11,12
*CLOSTERIUM PSEUDOLUNULA* Borge (×215), 75

13
*CLOSTERIUM PRITCHARDIANUM* Arch. (×215), 74

14
*CLOSTERIUM TUMIDUM* Johns. var. *NYLANDICUM* Grönbl. (×425), 75

15
*CLOSTERIUM ACUTUM* Bréb. (×425), 74

16
*CLOSTERIUM ROSTRATUM* Ehrenb. (×215, ×425), 75

17
*PLEUROTAENIUM TRUNCATUM* (Bréb.) Näg. morpha (×215), 77

18
*PLEUROTAENIUM TRABECULA* (Ehrenb.) Näg. var. *CRASSUM* Wittr. (×215,×860), 77

19,20
*PLEUROTAENIUM EHRENBERGII* (Bréb.) de Bary morpha (19×215,×860; 20×215), 76

21-23
*EUASTRUM INSULARE* (Wittr.) Roy var. *SILESIACUM* Grönbl. f. *MINUS* Presc. and Scott (×1000), 78

24-26
*EUASTRUM BIDENTATUM* Näg. (×640), 77

27
*EUASTRUM DUBIUM* Näg var. *MAIUS* Croasd. (×640), 77

*Closterium acerosum* (Schrank) Ehrenberg.
Plate XI, fig. 9

Cells 370 $\mu$ × 36 $\mu$ (10.3×), apex c. 5 $\mu$, striae 10 in 10 $\mu$. Plants large, nearly straight, apex rather abruptly tapered and truncate; wall finely striate, the striae somewhat crenate with a single row of puncta between them; pyrenoids 6 to 16, irregularly linear.

**Habitat**
In squeezings from moss at edge of a large permanent pond. July.

**Station**
78-r.

---

*Closterium acutum* Bréb.
Plate XI, fig. 15

Cell 122 $\mu$ × 6 $\mu$ (20.3×), apex c. 2 $\mu$. Plant small, slender, little curved, evenly tapered; 4 pyrenoids; wall smooth.

**Habitat**
In squeezings from moss at bottom of permanent pond. July.

**Station**
31-r.

---

*Closterium dianae* Ehrenb.
Plate XI, fig. 1

Cells 158 $\mu$ × 17 $\mu$ (9.3×), 125 degrees of arc; apex obliquely truncate with apical nodule. A little smaller than the type but agreeing well with forms seen in material from Devon Island and Alaska.

**Habitat**
In squeezings from moss at edge of tarn. July.

**Station**
34-r.

---

*Closterium? lunula* (Müll.) Nitzsch
Plate XI, fig. 10

Cells 430-460 $\mu$ × 63-70 $\mu$ (6.6-7×), apex 10-15 $\mu$, about 30 degrees of arc. Cells large, nearly straight, tapered rather abruptly to the rounded-truncate apex; wall smooth. The 2 cells seen were empty and somewhat twisted, so identification is uncertain, but size, proportions and curvature point to *C. lunula.*

**Habitat**
From bottom and in squeezings from moss at edge of a permanent and a semipermanent pond. July.

**Stations**
32-r, 78-o.

---

*Closterium parvulum* Näg.
Plate XI, fig. 2

Cells 130-138 $\mu$ × 12-13 $\mu$ (10-11×), 125-137 degrees of arc. A little larger than type but normal in shape, curvature and apices, and agreeing with forms from Alaska.

**Habitat**
In squeezings from moss at edge of tarn and permanent pond. July.

**Stations**
13-rr, 34-o.

---

*Closterium pritchardianum* Archer
Plate XI, fig. 13

Cells 430-600 $\mu$ × 42-56 $\mu$ (8.2-11×), apex 8-10 $\mu$, 40-50 degrees of arc. Cells large, slightly and evenly curved, with the ventral margin concave and apices rather abruptly

tapered and usually bent backward; wall apparently smooth; 7 to 16 pyrenoids.

**Habitat**
In squeezings from moss and in open water in permanent and temporary ponds. July, August.

**Stations**
13-rr, 21A-r, 80-r.

---

*Closterium pseudolunula* Borge (including *C. spetsbergense* Borge)
Plate XI, figs. 11, 12

Cells 248-285 (460) $\mu$ × 40-47 (70)$\mu$(6-6.8 ×), apex 8-10 $\mu$, (30) 40-62 degrees of arc. Cell slightly curved, evenly tapering to bluntly rounded apices, ventral surface mostly straight or slightly concave; wall smooth. This plant most closely resembles *C. spetsbergense* Borge, which Krieger (1937: 305) includes under *C. pseudolunula* Borge. It also somewhat resembles *C. lanceolatum* Kütz., but differs in its broader apex.

**Habitat**
In squeezings from moss at edge of large and small ponds. July, August.

**Stations**
32-c, 78-c, 79A-r.

---

*Closterium rostratum* Ehrenb.
Plate XI, fig. 16

Cell 380 $\mu$ × 23 $\mu$ (17 ×), apex 4 $\mu$. Cells slender, slightly curved, spindle-shaped, rather abruptly tapered; wall striate, c. 10 striae in 10 $\mu$, striae resolving into puncta toward ends of cell.

**Habitat**
In open water of permanent pond. July.

**Station**
3-r.

---

*Closterium tumidum* Johnson var. *nylandicum* Grönbl.
Plate XI, fig. 14

Cells 103-118 $\mu$ × 7.5-9.5 $\mu$ (10.4-12.3 ×), apex 2.3-2.5 $\mu$. Plants small, little curved, slender, but swollen on ventral surface; apices rounded-truncate; pyrenoids 2(4); wall smooth.

**Habitat**
In open water and in squeezings from moss on bottom of permanent ponds. July.

**Stations**
21A-r, 21B-r.

---

*Closterium venus* Kütz. var. *venus*
Plate XI, figs. 3, 4

Cells 53-85 $\mu$ × 8-10 $\mu$ (6-9.4 ×), 150-175 degrees of arc.

**Habitat**
In squeezings from moss at edge of tarns and a permanent pond. July.

**Stations**
30-o, 33-rr, 36-r.

---

*Closterium venus* Kütz. var. *apollonionis* Croasdale 1965: 310, pl. I, figs. 18-20
Plate XI, fig. 5

Cells 87-132 $\mu$ × 12-19 $\mu$ (6.4-9 ×), 130-165 degrees of arc. A variety differing from var. *venus* in larger size, and from var. *crassum* in greater slenderness; apices more rounded than in *C. parvulum* Näg. or *C. dianae* Ehrenb., and mostly not thickened.

**Habitat**
In all wet situations, but mostly in squeezings from moss at edge of tarns and permanent ponds; the commonest *Closterium* and one of the commonest desmids. July, August.

**Stations**
4-c, 5-r, 10-r, 13-o, 17-r, 19-r, 21A-o, 21B-o, 21C-o, 30-r, 32-cc, 34-cc, 35-r, 36-c, 37-rr, 38-r, 50-r, 55-o, 76-r, 78-o, 79-r, 83-r.

---

*Closterium venus* Kütz. var. *crassum* Croasdale 1955: 527, pl. VI, figs. 12-14
Plate XI, figs. 6-8

Cells 80-100 $\mu$ × 13-18 $\mu$ (4.8-6.4×), 144-173 degrees of arc. The variety differs from var. *venus* in its larger and much stouter cells; apices mostly not thickened.

**Habitat**
In all sizes of ponds but most abundant in squeezings from moss at edge of tarns and permanent ponds, also in open water and bottom debris; very common. July, August.

**Stations**
4-r, 6-r, 9-o, 10-rr, 12-o, 21A-c, 28-c, 30-c, 31-c, 34-c, 36-r, 38-r, 39-c, 76-r, 78-cc, 79-o, 79A-c.

---

*Closterium* spp.

**Stations**
21A-r, 50-o.

---

## *PLEUROTAENIUM* Nägeli 1849

**Key to the species found on Ellesmere Island**

1 Apices with a circle of nodules ..... 2
1 Apices smooth, without nodules ..... *P. trabecula*
2 Cells less than 10 times as long as broad, apical nodules and basal inflation inconspicuous ..... *P. truncatum*
2 Cells 11 or more times as long as broad, apical nodules and basal inflation conspicuous ..... *P. ehrenbergii*

---

*Pleurotaenium ehrenbergii* (Bréb.) de Bary morpha
Plate XI, figs. 19, 20

Cells 280-435 $\mu$ × 25-30 $\mu$ (11-14.5×), apex 17-20 $\mu$. Plants relatively shorter than the type, but not as short as var. *curtum* Krieg.; 4 to 5 visible polar nodules, only one slight inflation above isthmus, wall punctate.

**Habitat**
In squeezings from moss and in open water, in tarns and permanent ponds; the commonest species of *Pleurotaenium*. July, August.

**Stations**
5-r, 12-rr, 30-r, 34-c, 35-r, 36-c, 39-r.

---

*Pleurotaenium trabecula* (Ehrenb.) Näg. var. *crassum* Wittr.
Plate XI, fig. 18

Cells 340-350 $\mu$ × 40-48 $\mu$ (7.2-8.5×), apex 25 $\mu$, relatively stouter.

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds. July.

**Stations**
30-o, 36-r, 38-r.

---

*Pleurotaenium truncatum* (Bréb.) Näg. morpha
Plate XI, fig. 17

Cells 305-340 $\mu$ × 42-43 $\mu$ (7-8 ×), apex 19-24 $\mu$, isthmus c. 25 $\mu$. Plants smaller and less swollen than type, approaching var. *farquharsonii* (Roy and Bissett) West and West. Semicells only slightly tumid, but not strongly tapered below apex, 3 to 6 visible polar nodules, one slight inflation above isthmus; wall punctate.

**Habitat**
In squeezings from moss at edge of tarn and temporary pond. July.

**Stations**
35-r, 79A-r.

---

## *EUASTRUM* Ehrenberg 1932

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Face of semicells with a few large granules, usually in middle and within lobes ..... | *E. bidentatum* |
| 1 | Face of semicells without granules ..... | 2 |
| 2 | Cells with 2 lateral lobes and notched apex, cells more than 30 $\mu$ long ..... | *E. dubium* |
| 2 | Cells with one lateral lobe and broadly retuse apex, cells less than 20 $\mu$ long ..... | *E. insulare* |

---

*Euastrum bidentatum* Näg.
Plate XI, figs. 24-26

Cells 50-56 $\mu$ × 31-34 $\mu$ (1.53-1.7×), isthmus 8-11 $\mu$. In most of the Ellesmere plants the angles tend to be rounded, and the facial ornamentation reduced.

**Habitat**
In squeezings from moss at edge of tarns and mostly permanent ponds. July, August.

**Stations**
9-o, 12-r, 13-o, 30-c, 31-r, 33-r, 35-r, 39-o.

---

*Euastrum dubium* Näg. var. *maius* Croasdale 1965: 312, pl. II, figs. 6, 7
Plate XI, fig. 27

Cells 36-44 $\mu$ × 22-28 $\mu$ (1.4-1.76 ×), isthmus 6-8 $\mu$, thickness 17-18 $\mu$. As in the Devon Island form, the angles are rounded and the

facial ornamentation sometimes reduced.

**Habitat**
From bottom material and open water, but chiefly in squeezings from moss at edge of tarns and permanent ponds; the commonest species of the genus. June, July, August.

**Stations**
1-c, 4-c, 5-r, 10-r, 13-o, 17-r, 30-o, 31-r, 36-r, 37-o, 38-r, 39-o, 78-o, 79-r.

---

*Euastrum insulare* (Wittr.) Roy var. *silesiacum* Grönbl. f. *minus* Prescott and Scott 1945: 241, pl. II, fig. 15
Plate XI, figs. 21-23

Cells 15-16 $\mu$ × 12-13 $\mu$ (1.16-1.33 ×), isthmus 3-4 $\mu$, thickness c. 8 $\mu$. The Ellesmere forms resemble most closely Krieger's figure from the Andes in Krieger and Bourrelly (1956: 149, pl. II, fig. 20).

**Habitat**
In squeezings from moss at edge and from bottom debris of permanent ponds. July, August.

**Stations**
3-r, 13-r, 18-c.

---

*Euastrum* spp.

**Station**
1-rr.

---

## *ACTINOTAENIUM* (Nägeli) Teiling 1954

**Key to the species found on Ellesmere Island**

| | | |
|---|---|---|
| 1 | Sinus a notch ..... | 2 |
| 1 | Sinus a broad, shallow excavation ..... | *A. diplosporum* |
| 2 | Apex truncate or broadly rounded, its wall not thickened ..... | *A. cucurbita* |
| 2 | Apex tapered, with thickened wall ..... | *A. curtum* |

---

*Actinotaenium cucurbita* (Bréb.) Teiling 1954: 406, fig. 66 var. *cucurbita* f. *minus* Teiling 1954: 407
Plate XII, fig. 4

Cell 20 $\mu$ × 9 $\mu$ (2.2 ×), apex 8 $\mu$. Cells cylindrical, semicells barely tapered from slightly notched sinus to rounded-truncate apex, wall punctate.

**Habitat**
In squeezings from moss at edge of permanent pond. July.

**Station**
13-rr.

---

*Actinotaenium cucurbita* (Bréb.) Teil. var. *attenuatum* Teiling 1954: 407, figs. 67-69
Plate XII, figs. 2, 3

Cells 37-51 $\mu$ × 17-28 $\mu$ (1.8-2.2 ×), isthmus 18-21 $\mu$. Cells tapering from notched sinus to rounded apex, wall punctate.

**Habitat**
Everywhere in tarns and all sizes of ponds and a creek; the commonest species of the genus. July, August, September.

**Stations**
9-c, 12-o, 17-rr, 21A-r, 21B-r, 28-r, 36-o, 37-rr, 38-r, 39-o, 42-cc, 50-r, 55-r, 71-rr, 78-o, 79-c, 79A-r, 83-r.

---

*Actinotaenium curtum* (Bréb.) Teiling 1954: 390, fig. 1
Plate XII, fig. 1

Cells 39-42 $\mu$ × 19 $\mu$ (2.04-2.2 ×). Cells fusiform, evenly tapered to narrow apex that shows a wall thickening; wall punctate.

**Habitat**
In bottom material from semipermanent pond, also from lake. July, September.

**Stations**
71-r, A-r, E-o (in Whelden 1947: 77, as *Cosmarium curtum* (Bréb.) Ralfs).

---

*Actinotaenium diplosporum* (Lundell) Teiling 1954: 411 var. *diplosporum* f. **arcticum** f.n.
Plate XII, fig. 5

*Cellulae 73-77 $\mu$ long., 40-41 $\mu$ lat. (1.8-1.9 ×), 37-39 $\mu$ lat. isth. Cellulae magnae, non, autem, tam magnae quam f.* maius, *et relative crassiores; chloroplastus valde lobatus; membrana punctata, ad apicem multum incrassata. Specimen typicum apud muscos in lacu Skeleton Lake num. 34 dicto, d. 4, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 67-34-23a, isotype presumably in vial No. A23; both deposited in the National Museum of Natural Sciences, Ottawa.

Cells 73-77 $\mu$ × 40-41 $\mu$ (1.8-1.9×), isthmus 37-39 $\mu$. Cells large, but not as large as f. *maius* Teiling (1954: 413), and relatively stouter; chloroplast much lobed; wall punctate, markedly thickened at apex.

**Habitat**
In squeezings from moss at edge of permanent pond and a tarn. July.

**Stations**
18-rr, 34-c.

---

*Actinotaenium diplosporum* (Lund.) Teil. var. *americanum* (West and West) Teiling 1954: 413, fig. 75
Plate XII, figs. 6, 7

Cells 52-54 $\mu$ × 23-26 $\mu$ (2-2.3 ×), isthmus 21-25 $\mu$. Cells with wide, shallow excavation; broadest part of semicell in upper half, apex broadly rounded, its wall not thickened; cell wall punctate.

**Habitat**
In squeezings from moss at edge of tarn. July.

**Station**
12-r.

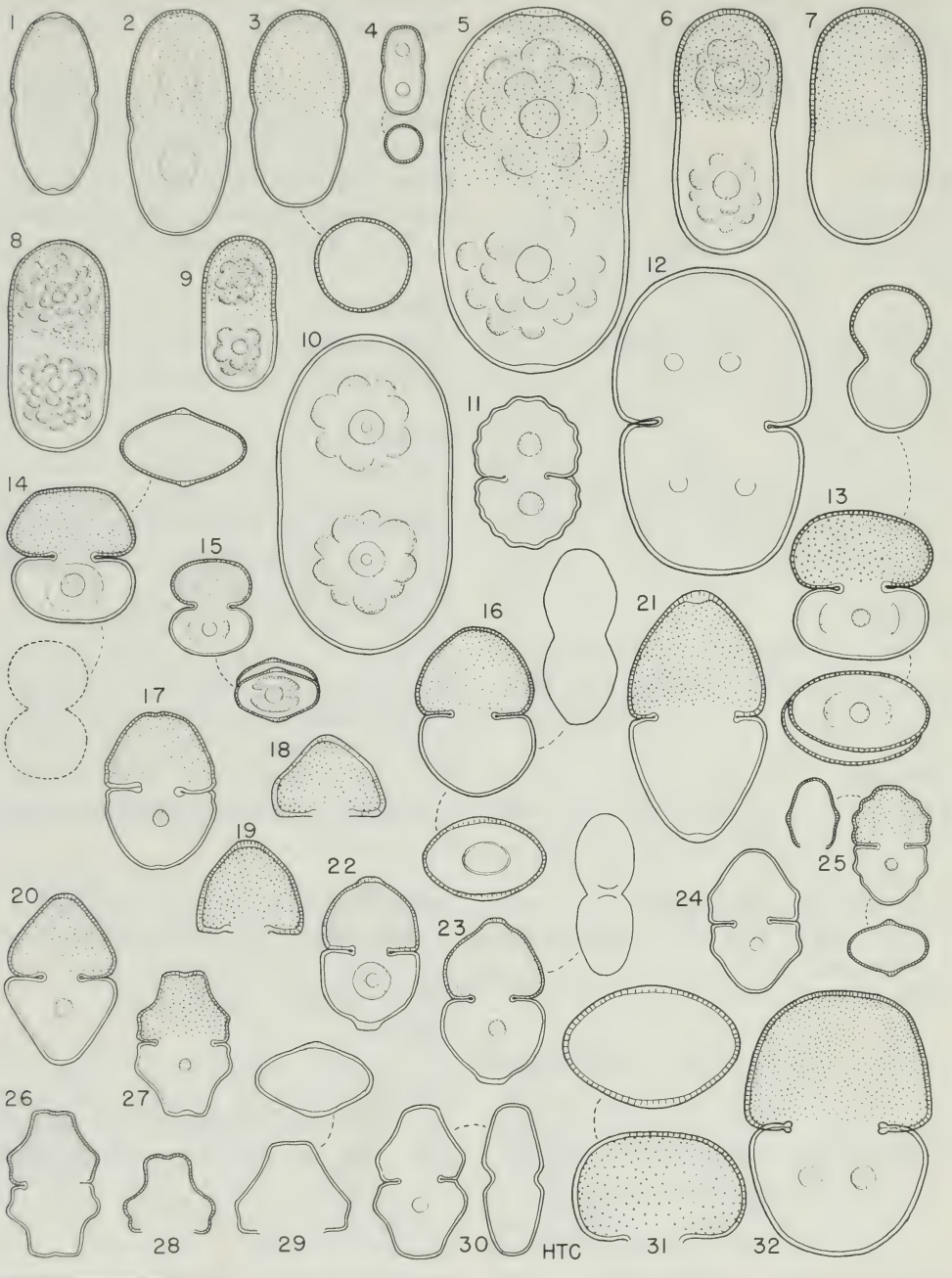
---

*Actinotaenium diplosporum* (Lund.) Teil. var. *americanum* West and West) Teiling 1954: 413 f. *minus* Teiling 1954: 413, fig. 76
Plate XII, figs. 8, 9

Cells 33-42 $\mu$ × 15-22 $\mu$ (2-2.2 ×), similar to variety but smaller.

**Habitat**
In squeezings from moss in permanent and semipermanent pond. July.

## Plate XII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**Stations**
42-c, 55-r.

---

*Actinotaenium diplosporum* (Lund.) Teil. var. **australe** (Racib.) comb. n. *(Penium australe* Raciborski 1892: 367, pl. I, fig. 11)
Plate XII, fig. 10

Cell 68 $\mu$ × 38 $\mu$ (1.8 ×), isthmus 37 $\mu$. (Raciborski's plant from New South Wales was 69 $\mu$ × 39 $\mu$, isthmus 38 $\mu$.) Cells relatively broader than var. *diplosporum,* with very shallow excavation and more tapered apex, which does not have a thickened wall; cell wall apparently smooth.

**Habitat**
In squeezings from moss at edge of permanent pond. July.

**Station**
4-r.

---

**Plate XII (all × 640)**

**Figure**

1
*ACTINOTAENIUM CURTUM* (Bréb.) Teil., 79

2,3
*ACTINOTAENIUM CUCURBITA* (Bréb.) Teil. var. *ATTENUATUM* Teil., 78

4
*ACTINOTAENIUM CUCURBITA* (Bréb.) Teil. var. *CUCURBITA* f. *MINUS* Teil., 78

5
*ACTINOTAENIUM DIPLOSPORUM* (Lund.) Teil. var. *DIPLOSPORUM* f. **ARCTICUM** f.n., 79

6,7
*ACTINOTAENIUM DIPLOSPORUM* (Lund.) Teil. var. *AMERICANUM* (West and West) Teil., 79

8,9
*ACTINOTAENIUM DIPLOSPORUM* (Lund.) Teil. var. *AMERICANUM* (West and West) Teil. f. *MINUS* Teil., 79

10
*ACTINOTAENIUM DIPLOSPORUM* (Lund.) Teil. var. **AUSTRALE** (Racib.) comb. n., 81

11
*COSMARIUM UNDULATUM* Corda var. *ALASKANUM* Croasd., 109

12
*COSMARIUM SUBCUCUMIS* Schmidle f. *BOREALE* Croasd. morpha, 105

13
*COSMARIUM PHASEOLUS* Bréb. var. *PHASEOLUS* morpha, 95

*14*
*COSMARIUM PHASEOLUS* Bréb. var. *ELEVATUM* Nordst., 95

15
*COSMARIUM PHASEOLUS* Bréb. var. *PHASEOLUS* f. *MINUS* Boldt, 95

16-20
*COSMARIUM GRANATUM* Bréb. var. *GRANATUM,* 89

21
*COSMARIUM GRANATUM* Bréb. var. *ELONGATUM* Nordst., 89

22,23
*COSMARIUM GRANATUM* Bréb. var. *GRANATUM* f. **MESSIKOMMERI** f.n., 89

24
*COSMARIUM GRANATUM* Bréb. var. *NORDSTEDTII* Hansg., 89

25
*COSMARIUM SUBGRANATUM* (Nordst.) Lütkem., 108

26
*COSMARIUM POKORNYANUM* (Grun.) West and West var. *POKORNYANUM,* 97

27
*COSMARIUM POKORNYANUM* (Grun.) West and West var. *POKORNYANUM* morpha, 98

28
*COSMARIUM POKORNYANUM* (Grun.) West and West var. *GROENBLADII* Först., 98

29,30
*COSMARIUM POKORNYANUM* (Grun.) West and West var. *TAYLORII* Grönbl., 98

31
*COSMARIUM SUBTUMIDUM* Nordst. var. *GROENBLADII* Croasd., 108

32
*COSMARIUM PSEUDONITIDULUM* Nordst. var. *VALIDUM* West and West, 98

## *COSMARIUM* Corda 1834

### Key to the species found on Ellesmere Island

| | | |
|---|---|---|
| 1 | Cell wall smooth or punctate, margin entire or undulate, never granular | 2 |
| 1 | Cell wall granular with large or small granules | 28 |
| 2 | Semicells circular, semicircular, pyramidal or rectangular in outline | 3 |
| 2 | Semicells transversely elliptical, hexagonal or polygonal in outline | 22 |
| 3 | Semicells circular or semicircular in outline | 4 |
| 3 | Semicells pyramidal or rectangular in outline | 7 |
| 4 | Semicells circular | *C. moniliforme* |
| 4 | Semicells semicircular | 5 |
| 5 | Margin of semicell undulate | 6 |
| 5 | Margin of semicell entire | *C. subcucumis* |
| 6 | Cells more than 25 $\mu$ long | *C. undulatum* |
| 6 | Cells less than 25 $\mu$ long | *C. impressulum* |
| 7 | Semicells pyramidal | 8 |
| 7 | Semicells rectangular | 16 |
| 8 | Margin of semicells crenate or undulate or constricted | 9 |
| 8 | Margin of semicells entire or with very slight crenations just above isthmus | 13 |
| 9 | Cells evenly crenate, 60 $\mu$ or more long | 10 |
| 9 | Cells not evenly crenate or undulate | 11 |
| 10 | Cells more than 100 $\mu$ long, c. 1.4 times as long as broad, crenae slight | *C. tyrolicum* |
| 10 | Cells less than 75 $\mu$ long, c. 1.2 to 1.3 times as long as broad, crenae well marked | *C. obtusatum* |
| 11 | Semicells constricted just below apex, cells 40 $\mu$ or more long | *C. holmiense* |
| 11 | Wall of semicells entire or with 1 to 3 marked undulations above the isthmus | 12 |
| 12 | Upper margin of semicell concave to apex, which is truncate or retuse | *C. pokornyanum* |
| 12 | Lateral margin of semicell with 3 crenations | *C. subgranatum* |
| 13 | Apex narrow, rounded or with apical indentation | 14 |
| 13 | Apex broad, truncate with rounded corners | 15 |
| 14 | Apex rounded | *C. granatum* |
| 14 | Apex with indentation | *C. laeve* |

15 Cells nearly 1.5 times longer than broad ..... *C. pseudonitidulum*
15 Cells very little longer than broad ..... *C. subtumidum*
16 Lateral margin of semicells concave, or rarely, straight ..... 17
16 Lateral margin of semicells straight or convex ..... 19
17 Cells about 2 times as long as broad, constriction slight and open ..... *C. anceps*
17 Cells not much longer than broad, sinus deep and narrow ..... 18
18 Lateral margins of semicells diverging from isthmus, then converging to narrower apex ..... *C. quadratulum*
18 Lateral margins nearly straight to the broad apex ..... *C. norimbergense*
19 Cells rectangular, less than 1.5 times as long as broad ..... 20
19 Cells elongate, 1.5 to 2.5 times as long as broad ..... 21
20 Cells large, 40 $\mu$ or more long ..... *C. rectangulare*
20 Cells small, less than 20 $\mu$ long ..... *C. exiguum*
21 Cells 2 or more times as long as broad, sinus slight and open ..... *C. debaryi*
21 Cells less than 2 times as long as broad, sinus closed ..... *C. quadratum*
22 Semicells transversely elliptical, smoothly rounded ..... 23
22 Semicells elliptic-hexagonal, subhexagonal or polygonal in outline ..... 24
23 Sinus closed ..... *C. phaseolus*
23 Sinus open ..... *C. bioculatum*
24 Semicells distinctly elliptic-hexagonal .... 25
24 Semicells polygonal ..... 26
25 Sinus open and obtuse, cells to 33 $\mu$ long ..... *C. pseudoprotuberans*
25 Sinus narrowly linear, cells to 11 $\mu$ long ..... *C. abbreviatum*
26 Semicells with 8 equal crenae ..... *C. impressulum*
26 Semicells with less than 8 crenae, broadest part of semicell knob-like ..... 27
27 Broadest part of semicell near apex, which is convex; semicell in end view very tumid ..... *C. capitulum*
27 Broadest part of semicell normally below apex, which is flat or retuse; semicell in end view ovate ..... *C. regnellii*
28 Semicells reniform or elliptical ..... 29
28 Semicells pyramidal or rectangular ..... 32
29 Cells more than 50 $\mu$ long ..... 30
29 Cells less than 40 $\mu$ long ..... 31

30 Sinus closed ..... *C. reniforme*
30 Sinus open, isthmus elongated ..... *C. pseudoholmei*
31 Sinus closed, surface granules irregular ..... *C. planogranatum*
31 Sinus open, surface granules in rows ..... *C. wittrockii*
32 Semicells pyramidal ..... 33
32 Semicells rectangular ..... *C. conspersum*
33 Semicells as long as broad or very slightly longer ..... 34
33 Semicells 1.25 or more times longer than broad ..... 43
34 Cells 50 $\mu$ or more long, apex truncate .... 35
34 Cells less than 50 $\mu$ long ..... 37
35 Apex not markedly produced, central granules in very regular concentric rows ..... 36
35 Apex markedly produced, central granules irregular ..... *C. turpinii*
36 Semicells with row of supraisthmal granules ..... *C. formosulum*
36 Semicells without row of supraisthmal granules ..... *C. quasillus*
37 Cells more than 20 $\mu$ long ..... 38
37 Cells less than 20 $\mu$ long; apex broad, flat, elevated ..... *C. humile*
38 Central ornamentation consisting of elongate granules or granules on elongate ridges ..... 39
38 Central ornamentation consisting of granules in circle or irregularly arranged ..... 41
39 Cells more than 30 $\mu$ long, very tumid in side and end view ..... *C. costatum*
39 Cells less than 30 $\mu$ long, only moderately tumid ..... 40
40 Semicells rather abruptly narrowed to apex, and with 3 to 4 median longitudinal ridges ..... *C. sexnotatum*
40 Semicells with broad apex, and with 6 median longitudinal ridges ..... *C. norwegicum*
41 Semicells with 20 or more uniform granules or small crenae around margin ..... *C. punctulatum*
41 Semicells with 12 to 15 smooth or bigranulate crenae around margin ..... 42
42 Marginal crenae bigranulate; no special supraisthmial granule ..... *C.* **septentrionale**
42 Marginal crenae smooth; conspicuous supraisthmial granule present ..... *C. subcrenatum*
43 Cells more than 70 $\mu$ long ..... 44
43 Cells 70 $\mu$ long or less ..... 46

| | | |
|---|---|---|
| 44 | Margin with flattened crenae; surface granules (warts) flattened, irregular, fading out toward centre | *C. ochthodes* |
| 44 | Margin with rounded crenae or large granules | 45 |
| 45 | Cells more than 90 $\mu$ long, central granules small and sparse or absent | *C. tetraophthalmum* |
| 45 | Cells less than 90 $\mu$ long, central granules flatter but larger than inframarginal granules; apex flattened, often indentate | *C. hornavanense* |
| 46 | Apex protracted, subapical crenae very large | *C. subeductum* |
| 46 | Apex not protracted, subapical crenae not, or not much, larger than others | 47 |
| 47 | Cells 35-70 $\mu$ long | 48 |
| 47 | Cells less than 35 $\mu$ long, semicells with only 3 lateral crenae | *C. crenatum* |
| 48 | Apex of semicell rounded, crenae granulate on margin | *C. pulcherrimum* |
| 48 | Apex generally flattened, crenae granulate only within the margin | *C. speciosum* |

---

*Cosmarium abbreviatum* Raciborski morpha
Plate XIV, fig. 22

Cell 10.5 $\mu$ × 10.5 $\mu$, isthmus 5 $\mu$, wall smooth. Differs from type in open sinus and smaller size, although it is not as small as f. *minor* West and West.

**Habitat**
In squeezings from moss at edge of tarn. August.
**Station**
35-r.

---

*Cosmarium anceps* Lund.
Plate XIV, figs. 6, 7

Cells 24-30 $\mu$ × 12-16 $\mu$ (1.6-2.3 ×), isthmus 9-13 $\mu$, thickness c. 10.5 $\mu$, wall smooth. Cells about twice as long as broad with short, slightly open sinus; semicells slightly tapered with nearly straight sides, rounded angles and slightly notched or excavate apex; in vertical view very tumid.

**Habitat**
In squeezings from moss at edge and bottom of tarns and all sizes of ponds. July.

**Stations**
12-rr, 31-r, 34-r, 37-rr, 39-r, 42-rr, 55-r, 67-r, 79-c.

---

*Cosmarium anceps* Lund. f. **arcticum** f.n.
Plate XIV, fig. 8

*Cellulae 32-36 $\mu$ long., 18-21 $\mu$ lat. (1.8 ×), 11.5-15 $\mu$ lat. isth., 13.5-17.5 $\mu$ crass. Forma differens apice latiore, sinu fere clauso;* C. tatrico *maxime cognata, differens, autem, apice inciso et membrana vix punctata. Magnitudine proportionibusque inter* C. ancipitem *et* C. tatricum *ob-*

*venit. Specimen typicum apud muscos in solo in stagno prope locum Blister Creek dictum, d. 22, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 68-49A-101, isotype presumably in vial No. A101; both deposited in the National Museum of Natural Sciences, Ottawa.

A form differing in its broader apex and nearly closed sinus; closest to *C. tatricum,* from which it differs in notched apex and only faintly punctate wall. In size and proportions it falls between *C. anceps* and *C. tatricum.* This form includes *C. anceps* f. *subparvulum* Larsen in Croasdale (1956: 14, pl. 8, fig. 19), and probably *C. anceps* in Skuja (1964: 203, pl. 34, figs. 1, 2) from Abisko, and *C. anceps* f. *subparvulum* in Förster (1965*a*: 133, pl. V, figs. 22, 23) from Torne-Lappmark.

**Habitat**
In squeezings from moss from bottom of pool. July.

**Station**
49A-r.

---

*Cosmarium bioculatum* Bréb. var. *bioculatum*
Plate XIV, fig. 1

Cells 14-20 $\mu$ × 13-16 $\mu$ (1.1-1.3×), isthmus 4-6 $\mu$, thickness 8-9 $\mu$. Cells very small, a little longer than broad, oblong-elliptic, with rather open sinus; wall smooth or finely punctate; in vertical view very slightly tumid.

**Habitat**
In squeezings from moss at edge of tarns and a permanent pond; common but very easily overlooked. July, August.

**Stations**
30-r, 34-o, 35-o, 36-o, 55-r.

---

*Cosmarium bioculatum* Bréb. var. *depressum* (Schaarschmidt) Schmidle f. *minus* Schmidle
Plate XIV, figs. 2, 3

Cells 10-11 $\mu$ × 9-10 $\mu$, isthmus 4-5.5 $\mu$, thickness c. 5-8 $\mu$, wall smooth or finely punctate. Cells smaller, depressed; sinus open.

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds. July, August.

**Stations**
4-r, 12-r, 13-r, 28-r, 30-o, 36-r, 38-o, 39-r, 79-o.

---

*Cosmarium capitulum* Roy and Biss. var. *groenlandicum* Børgesen 1894: 16, pl. I, fig. 5
Plate XIV, figs. 16-18

Cells 20-24 $\mu$ × 17-23 $\mu$ (1-1.2×), isthmus 6-10 $\mu$, thickness 11-14 $\mu$, wall clearly punctate. Semicells somewhat rectangular with extruded upper angles, convex apex and short open sinus; in vertical view very broadly oval with extruded angles.

**Habitat**
In squeezings from moss, in bottom material and in open water of tarns and a permanent pond. July.

**Stations**
18-o, 34-c, 36-r.

---

*Cosmarium conspersum* Ralfs var. *conspersum* f. **dickiei** comb. n. *(C. margaritatum* (Lund.) Roy and Biss. f. *pseudoconspersum* Dick 1926: 449, pl. 21, fig. 2)
Plate XVII, figs. 7, 8

Cells 84-102 $\mu$ × 60-75 $\mu$ (1.29-1.43 ×), isthmus 24-30 $\mu$. In size and shape similar to type, but punctate and differing in granulation, the granules being reduced in size along part of the lateral margins, resulting in an almost smooth area on the wall. In the form figured by Dick (1926: 449, pl. 21, fig. 2) the granules are all small except those in the upper angles of the semicells. In the forms seen in Ellesmere Island all granules were large except those on the lower part of the lateral walls and the lower median portion of the face of the cell. In addition, in the Ellesmere material the granules in the uppermost part of the cell were mostly bilobed or paired. Förster (1965*a*: 142, pl. VII, fig. 1) shows a nearly similar form from Torne-Lappmark (as *C. margaritatum* f. *pseudoconspersum*). West and West (1904-12, IV: 19) give as the only characters separating *C. conspersum* and *C. margaritatum* "the slight difference in the outward form of the semicells and the presence of regular punctulations between the granules". Some authors, finding these characters in conflict, have assumed the punctulations to be more important and have assigned their plants to *C. margaritatum*. However the cell shape (broader in the upper part of the semicell) seems to be more important as a diagnostic feature, and I propose the following additional new combinations: *C. conspersum* var. **sublatum** (Krieg.) comb. n. (*C. margaritatum* var. *sublatum* (Nordst.) Krieger 1932: 179, pl. 12, fig. 6); *C. quadrum* f. **punctatum** (Krieg.) comb. n. *(C. margaritatum* var. *quadrum* Krieger 1932: 179, pl. 12, fig. 7).

**Habitat**
In open water and in squeezings from moss at edge of tarns and a creek. July, August.
**Stations**
12-rr, 34-r, 35-r, 36-o, 50-r.

---

*Cosmarium conspersum* Ralfs var. *conspersum* f. *minus* Raciborski 1885: 75
Plate XVII, fig. 9

Cells 58-73 $\mu$ × 45-56 $\mu$ (1.3-1.4 ×), isthmus 17-22 $\mu$. Similar to the type but smaller, wall faintly punctate. Seen also in material from Devon Island (Croasdale 1965: 317, pl. VI, fig. 8).

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds. July, August.

**Stations**
3-r, 4-r, 12-rr, 13-r, 28-r, 30-r, 34-r, 39-r.

---

*Cosmarium conspersum* Ralfs var. *latum* (Bréb.) West and West morpha
Plate XVII, fig. 10

Cells 79-106 $\mu$ × 63-86 $\mu$ (1.2-1.25 ×), isthmus 23-26 $\mu$, wall punctate. Cells proportionally broader than type.

**Habitat**
In open water and in squeezings from moss at edge of a tarn and permanent and temporary ponds. July, August.

**Stations**
12-r, 13-r, 79A-r, C-r.

---

*Cosmarium conspersum* Ralfs var. *latum* (Bréb.) West and West f. *parvum* Croasdale 1965: 317, pl. VI, fig. 11
Plate XVII, fig. 11

Cells 60-70 $\mu$ × 48-57 $\mu$ (1.17-1.27 ×), isthmus 18-23 $\mu$, wall not punctate. Cells relatively broad as in var. *latum* but much smaller.

**Habitat**
In open water and in squeezings from moss at edge of tarns. July, August.

**Stations**
12-rr, 30-r, 34-c, 35-r.

---

*Cosmarium costatum* Nordst. f. *minus* Boldt 1888: 21
Plate XVI, fig. 23

Cells 31-34 $\mu$ × 25-26 $\mu$ (1.24-1.3 ×), isthmus 10-16 $\mu$, thickness 19-21 $\mu$.

**Habitat**
With other algae. July, August.

**Stations**
B-r, D-r.

---

*Cosmarium crenatum* Ralfs
Plate XVI, figs. 24, 25

Cells 28-32 $\mu$ × 20-25 $\mu$ (1.3-1.45 ×), isthmus 9-14 $\mu$, thickness c. 16 $\mu$. A relatively narrow form.

**Habitat**
With other algae. July.

**Stations**
34-r, A-r, D-r.

---

*Cosmarium debaryi* Arch.
Plate XIII, fig. 14

Cells 96-104 $\mu$ × 45-55 $\mu$ (2-2.3 ×), isthmus 34-35 $\mu$, thickness c. 48 $\mu$, wall punctate. A species easily recognized by its large size and lobed parietal chloroplasts.

**Habitat**
In squeezings from moss at edge and bottom of permanent and semipermanent ponds and a tarn, once also in open water. July.

**Stations**
28-r, 36-o, 38-r, 42-r, 79-r.

---

*Cosmarium exiguum* Arch. var. *subrectangulum* West and West
Plate XIV, figs. 14, 15

Cells 12.5-15 $\mu$ × 10-11 $\mu$ (1.25-1.36 ×), isthmus 4-5 $\mu$, thickness 7-8 $\mu$, wall smooth. Semicells nearly rectangular, in vertical view broadly oval. Similar to the forms seen by the author in Alaska and Devon Island.

**Habitat**
In squeezings from moss at edge of a tarn and a semipermanent pond. July.

**Stations**
30-r, 32-r.

---

*Cosmarium formosulum* Hoff var. *nathorstii* (Boldt) West and West
Plate XV, fig. 10

Cells 59 $\mu$ × 48 $\mu$ (1.23 ×), isthmus 15 $\mu$.

**Habitat**
With other algae. August.

**Station**
B-r.

---

*Cosmarium granatum* Bréb. var. *granatum*
Plate XII, figs. 16-20

Cells 25-43 $\mu$ × 18-27 $\mu$ (1.3-1.6×), isthmus 6-10 $\mu$, thickness 12-18 $\mu$, wall punctate. Semicells truncate-pyramidate with rounded angles and closed linear sinus, one chloroplast.

**Habitat**
Everywhere in tarns, all sizes of ponds and in a creek; one of the commonest desmids in the collection. June, July, August.

**Stations**
1-o, 3-c, 4-c, 5-c, 10-c, 12-c, 13-c, 17-rr, 18-c, 21A-o, 27-r, 28-cc, 30-cc, 31-o, 32-r, 33-o, 34-cc, 35-o, 36-o, 38-r, 39-r, 50-rr, 78-rr, 79-cc, 79A-cc.

---

*Cosmarium granatum* Bréb. var *granatum* f. **messikommeri** f. n. *(C. granatum* Bréb. in Messikommer 1944: 157, pl. XI, fig. 24)
Plate XII, figs. 22, 23

*Cellulae 33-40 $\mu$ long., 21-26 $\mu$ lat. (1.4-1.8×), 7-10 $\mu$ lat. isth. Forma differens apice semicellulae in protuberationem rotundatam abrupte extenso, aliter ut in planta typica. Specimen typicum apud muscos in lacu num. 10 dicto, d. 21, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 66-10-71a, isotype presumably in vial No. A71; both deposited in the National Museum of Natural Sciences, Ottawa.

A form differing in that it has the apex of the semicell abruptly extended into a rounded protuberance, otherwise like the type.

**Habitat**
Primarily among mosses at the edge of lakes and ponds; quite common. July, August.

**Stations**
1-c, 4-o, 5-r, 10-r, 13-r, 17-r, 21A-o, 28-r, 31-r, 34-o, B-cc.

---

*Cosmarium granatum* Bréb. var. *elongatum* Nordst.
Plate XII, fig. 21

Cells 42-53 $\mu$ × 23-28 $\mu$ (1.8-1.9×), isthmus 10-17 $\mu$, wall punctate or scrobiculate. Cells nearly twice as long as broad, outline sometimes angular.

**Habitat**
In squeezings from moss, and from bottom material in permanent ponds. June, July.

**Stations**
1-r, 21A-r, 39-c, 79-o.

---

*Cosmarium granatum* Bréb. var. *nordstedtii* Hansg.
Plate XII, fig. 24

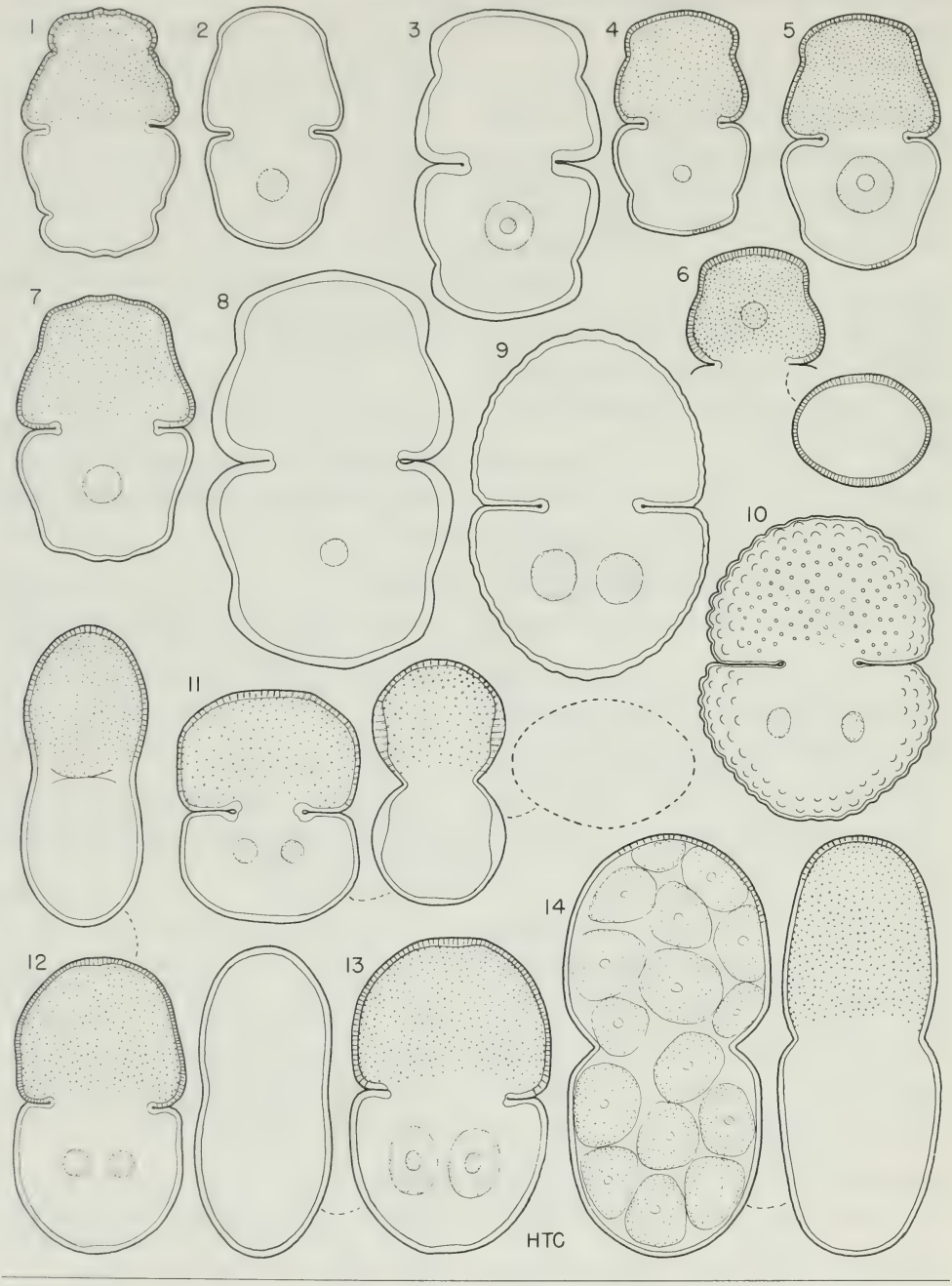
Cells 28-32 $\mu$ × 18-23 $\mu$ (1.4-1.6×), isthmus 5-8 $\mu$, thickness c. 13 $\mu$, wall smooth or finely punctate. Lateral walls of semicell at first diverging from isthmus, then abruptly converging to rounded apex.

**Habitat**
Primarily in squeezings from moss at edge of a permanent and semipermanent pond and a tarn. July, August.

**Stations**
32-r, 34-o, 79-r.

---

## Plate XIII



*Cosmarium holmiense* Lund. var. *holmiense* morpha
Plate XIII, fig. 1

Cells 54 μ × 34 μ (1.6 ×), isthmus 21 μ, wall punctate. Cells with angles more rounded and with only one indentation below the apex.

**Habitat**
In squeezings from moss at bottom of semipermanent pond. July.

**Station**
77-r.

---

*Cosmarium holmiense* Lund. var. *integrum* Lund.
Plate XIII, fig. 2

Cells 53-63 μ × 31-36 μ (1.7-1.75 ×), isthmus 18-20 μ, wall smooth. Sides of semicells nearly straight from rounded basal angles to dilated, convex apex; isthmus open.

**Habitat**
In squeezings from moss at edge and bottom of a tarn and a permanent pond. July, August.

**Stations**
28-o, 36-r.

---

*Cosmarium holmiense* Lund. var. *integrum* Lund. f. *constrictum* Gutwinski 1890: 67
Plate XIII, figs. 3, 4

Cells 44-67 μ × 26-39 μ (1.6-1.8 ×), isthmus 15-19 μ, thickness 18-23 μ. Semicells constricted below convex apex, sinus closed, wall smooth or faintly punctate. In Krieger and Gerloff (1965: 154) this plant is cited as *"C. holmiense* var. *constrictum* Gutw.". But Gutwinski named it as a form of var. *integrum,* and it seems more accurate, as well as more appropriate, to keep it that way.

---

## Plate XIII

**Figure**

1
*COSMARIUM HOLMIENSE* Lund. var. *HOLMIENSE* morpha (×640), 91

2
*COSMARIUM HOLMIENSE* Lund. var. *INTEGRUM* Lund. (×640), 91

3,4
*COSMARIUM HOLMIENSE* Lund. var. *INTEGRUM* Lund. f. *CONSTRICTUM* Gutw. (×640), 91

5,6
*COSMARIUM HOLMIENSE* Lund. var. *INTEGRUM* Lund. f. *LOBATUM* (Fil.) Růžička (×640), 92

7
*COSMARIUM HOLMIENSE* Lund. var. *INTERMEDIUM* Gutw. morpha (×640), 92

8
*COSMARIUM HOLMIENSE* Lund. var. *INTEGRUM* Lund. f. *MAIUS* Messik. (×640), 92

9
*COSMARIUM TYROLICUM* (Nordst.) Krieg. and Gerl. (×640), 109

10
*COSMARIUM OBTUSATUM* Schmidle morpha (×640), 94

11
*COSMARIUM RECTANGULARE* Grun. var. *CROASDALEAE* Först. (×640), 101

12
*COSMARIUM QUADRATUM* Ralfs f. **BOREALE** f. n. (×640), 100

13
*COSMARIUM QUADRATUM* Ralfs f. *WILLEI* West and West (×640), 101

14
*COSMARIUM DEBARYI* Arch. (×580), 88

**Habitat**
In squeezings from moss at edge of tarns, permanent and temporary ponds, "a wet area" and a creek. July, August.
**Stations**
12-cc, 27-r, 30-c, 34-r, 49A-o, 50-r, 78-r, 79-o.

---

*Cosmarium holmiense* Lund. var. *integrum* Lund. f. *lobatum* (Filarszky) Růžička 1956: 43, pl. I, fig. 14
Plate XIII, figs. 5, 6

Cells 44-63 $\mu$ × 26-42 $\mu$ (1.43-1.83×), isthmus 12-22 $\mu$, thickness 20-29 $\mu$, wall thick and closely punctate. Cells with angles much rounded, some with nearly flat apex.

**Habitat**
Principally in squeezings from moss at the edge of tarns, all sizes of ponds and a creek, twice taken by a net from open water; the commonest form of the *C. holmiense* group in the Ellesmere material. July, August.
**Stations**
9-r, 12-c, 13-r, 18-r, 21A-r, 21B-c, 27-o, 30-o, 31-o, 33-r, 34-o, 35-r, 36-o, 37-o, 39-o, 42-o, 50-r, 55-o, 76-r.

---

*Cosmarium holmiense* Lund. var. *integrum* Lund. f. *maius* Messikommer 1953: 551, pl. IV, fig. 6
Plate XIII, fig. 8

Cells 72-90 $\mu$ × 47-58 $\mu$ (1.53-1.63×), isthmus 23-32 $\mu$; wall to 2 $\mu$ thick, smooth or punctate. Cells in outline very like var. *integrum* but thick-walled and very large.

**Habitat**
In squeezings from moss in creek and tarn, also in a lake. July.

**Stations**
36-r, 50-r, A-r.

---

*Cosmarium holmiense* Lund. var. *intermedium* Gutw. morpha
Plate XIII, fig. 7

Cells 56-66 $\mu$ × 34-38 $\mu$ (1.53-1.8×), isthmus 18-22 $\mu$, wall punctate. Semicells with the biundulate apex of var. *holmiense* and the evenly curved sides of var. *integrum,* but also smaller and relatively shorter than the plant figured by Gutwinski.

**Habitat**
In squeezings from moss from permanent and semipermanent ponds. July.

**Stations**
1-rr, 38-r, 77-r.

---

*Cosmarium hornavanense* Gutw. f. *arcticum* Croasdale 1965: 320, pl. VI, figs. 3-4
Plate XVII, figs. 2-5

Cells 71-88 $\mu$ × 57-69 $\mu$ (1.22-1.46×), isthmus 17-23 $\mu$, thickness 36-40 $\mu$. Semicells pyramidate with margin rounded and strongly crenate, apex flattened and irregularly indentate in middle; with several rows of granules radially and concentrically arranged within the margin and with indistinct, flattened, usually somewhat elongate granules above the isthmus, punctate between the granules. In vertical view broadly ovate, in lateral view semicircular; two pyrenoids.

**Habitat**
In practically all wet situations, especially in squeezings from moss at edge of tarns and mostly permanent ponds; one of the commonest des-

mids in the Ellesmere collections. June, July, August.

**Stations**
1-o, 3-c, 4-c, 5-r, 6-r, 10-o, 11-r, 12-cc, 13-o, 17-r, 18-rr, 21A-r, 28-r, 30-cc, 31-o, 32-o, 33-o, 34-c, 35-r, 36-cc, 37-rr, 38-r, 39-r, 42-o, 76-r, 78-cc, C-o.

---

*Cosmarium humile* (Gay) Nordst. var. *lacustre* Taylor 1934: 254, pl. 51, fig. 30
Plate XVI, figs. 12-14

Cells 15-17 $\mu$ × 14-16 $\mu$, isthmus 5-6 $\mu$, thickness c. 9 $\mu$. Semicells trapeziform and broader at the base, upper part of side retuse, apex flattened and undulate; 4 to 6 longitudinal costae across the face.

**Habitat**
In squeezings from moss at the bottom and edge of tarns and permanent ponds, also in open water. July, August.

**Stations**
3-cc, 4-c, 5-r, 18-cc, 28-r, 33-c, 34-r, 35-r, 38-r.

---

*Cosmarium impressulum* Elfving var. *suborthogonum* Taft
Plate XIV, figs. 23, 24

Cells 19-22 $\mu$ × 13-18 $\mu$ (1.16-1.50 ×), isthmus 4-7 $\mu$, thickness c. 10 $\mu$, wall smooth.

**Habitat**
In squeezings from moss at edge and bottom of tarns and all sizes of ponds, also in open water; very common in northern regions. July, August.

**Stations**
3-o, 4-o, 5-o, 6-r, 10-c, 12-c, 18-o, 21A-c, 27-r, 28-o, 30-o, 31-r, 34-c, 35-r, 36-o, 39-r, 78-r, 79A-o.

---

*Cosmarium laeve* Rabenh. morpha 1
Plate XIV, fig. 27

Cells 20-23 $\mu$ × 13-14.5 $\mu$ (1.54-1.6×), isthmus 6-7 $\mu$, wall smooth. Cells small and relatively long, outline irregular.

**Habitat**
In squeezings from moss near edge of permanent ponds. July.

**Stations**
4-r, 79-o.

---

*Cosmarium laeve* Rabenh. morpha 2
Plate XIV, figs. 28, 29

Cells 28-30 $\mu$ × 20-24 $\mu$ (1.45-1.5 ×), isthmus 6-7.5 $\mu$, thickness 12-13 $\mu$, wall smooth or widely punctate. Cells large, outline slightly irregular. This could possibly be a large form of *C. meneghinii* Bréb.

**Habitat**
In squeezings from moss at edge of tarns and permanent and semipermanent ponds. July, August.

**Stations**
10-o, 18-rr, 31-r, 32-r, 34-r.

---

*Cosmarium moniliforme* (Turp.) Ralfs
Plate XIV, fig. 4

Cells 30-34 $\mu$ × 18-20 $\mu$ (1.66-1.7 ×), isthmus c. 10 $\mu$, thickness 18-20 $\mu$, wall smooth. Semicells circular in all views, sinus acute and widely open.

**Habitat**
In squeezings from moss at edge of tarn and permanent pond. July.

**Stations**
18-rr, 34-r.

---

*Cosmarium moniliforme* (Turp.) Ralfs f. *punctatum* Lagerh.
Plate XIV, fig. 5

Cell 22 $\mu$ × 12 $\mu$ (1.83 ×), isthmus 7 $\mu$, thickness 12 $\mu$, wall punctate. The Ellesmere plant is a little smaller than the dimensions given for this form, but is within the size range for the species.

**Habitat**
In squeezings from moss at edge of tarn. July.
**Station**
34-r.

---

*Cosmarium norimbergense* Reinsch f. *boldtii* Messikommer 1929: 153, pl. I, fig. 6
Plate XIV, figs. 9-11

Cells 10-11 $\mu$ × 9-11 $\mu$, isthmus 3-5 $\mu$, thickness c. 7 $\mu$, wall smooth. Cells very little longer than broad, showing a small tumour in vertical view. The Ellesmere plants are a little larger than Messikommer's but agree well with specimens collected by the author in Alaska (Croasdale 1956: 42, pl. 8, fig. 21).

Krieger and Gerloff (1965: 190, pl. 37, fig. 11) put Messikommer's form as a variety of *C. quadratulum* (Gay) de Toni. However this does not seem correct since the latter typically has a narrower isthmus, with the sinus soon opening to form a rather angular base of the semicell. Also in *C. quadratulum* the apex is markedly retuse, and in vertical view the ratio of axes is given as 1 to 2, whereas that of *C. norimbergense* is 1 to 1.6. (In the Ellesmere material it is 1 to 1.5.)

**Habitat**
In squeezings from moss at edge of tarn. July, August.
**Stations**
34-r, B-r.

---

*Cosmarium norwegicum* Strøm 1926: 214, pl. V, figs. 15, 16
Plate XVI, figs. 21, 22

Cells 24-26 $\mu$ × 24-25 $\mu$, isthmus 7-9 $\mu$, thickness 13 $\mu$, one pyrenoid. Semicells in vertical view rather narrow, with median tumour. Superficially resembling *C. subcostatum* Nordst., but cells are smaller and more depressed, with broader base and with only one pyrenoid. It is possible that many of the small depressed forms with only one pyrenoid, now placed under *C. subcostatum,* belong here.

**Habitat**
With other algae in tarn. July, August.
**Stations**
34-r, B-r.

---

*Cosmarium obtusatum* Schmidle morpha
Plate XIII, fig. 10

Cell 64 $\mu$ × 50 $\mu$ (1.28 ×), isthmus 17 $\mu$. Differs in being larger, relatively broader, and in having more marginal and intramarginal undulations; almost identical to forms figured by Messikommer (1954: pl. IV, fig. 7) and by Rybníček (1960: 140, 153, fig. 62).

**Habitat**
In squeezings from moss in small pond. July.
**Station**
79A-r.

---

*Cosmarium ochthodes* Nordst. var. *amoebum* W. West
Plate XVII, fig. 6

Cells 78-90 $\mu$ × 54-67 $\mu$ (1.28-1.53 ×), isthmus 18-25 $\mu$, thickness 30-47 $\mu$. Warts on surface very irregular in outline, breaking up into small units away from the margin and replaced by small granules in middle of cell; wall punctate between granules; two pyrenoids. Usually the cells of this variety are larger, with broader apex than in the type, but this difference was not seen in the Ellesmere material.

**Habitat**
In squeezings from moss at edge and shore and in open water of tarns and mostly permanent ponds. July, August.

**Stations**
12-o, 21A-o, 28-r, 30-c, 31-o, 34-o, 36-r, 39-r, 55-r, 79-o, 83-r.

---

*Cosmarium phaseolus* Bréb. var *phaseolus* morpha
Plate XII, fig. 13

Cells 28-31 $\mu$ × 27-30 $\mu$, isthmus 9-11 $\mu$, thickness c. 17 $\mu$; wall coarsely punctate, usually with fine puncta in addition. Semicells somewhat angular, in vertical view relatively narrow, without special protuberance.

**Habitat**
In squeezings from moss at edge of tarns. July, August.

**Stations**
34-o, 36-cc, B-r.

---

*Cosmarium phaseolus* Bréb. var. *phaseolus* f. *minus* Boldt
Plate XII, fig. 15

Cell 20 $\mu$ × 17 $\mu$, isthmus 7 $\mu$, thickness 12 $\mu$, wall punctate. Cells similar to type but smaller.

**Habitat**
In a tarn. July.

**Station**
34-r.

---

*Cosmarium phaseolus* Bréb. var. *elevatum* Nordst.
Plate XII, fig. 14

Cells 26-33 $\mu$ × 23-30 $\mu$, isthmus 8-11 $\mu$, thickness 14-20 $\mu$, wall punctate. Semicells elliptic with sides tapering to flattened apex, lateral and vertical views showing median protuberance, sinus linear and closed; one pyrenoid.

**Habitat**
Everywhere in tarns and permanent ponds, and once in a small stream; common. July, August.

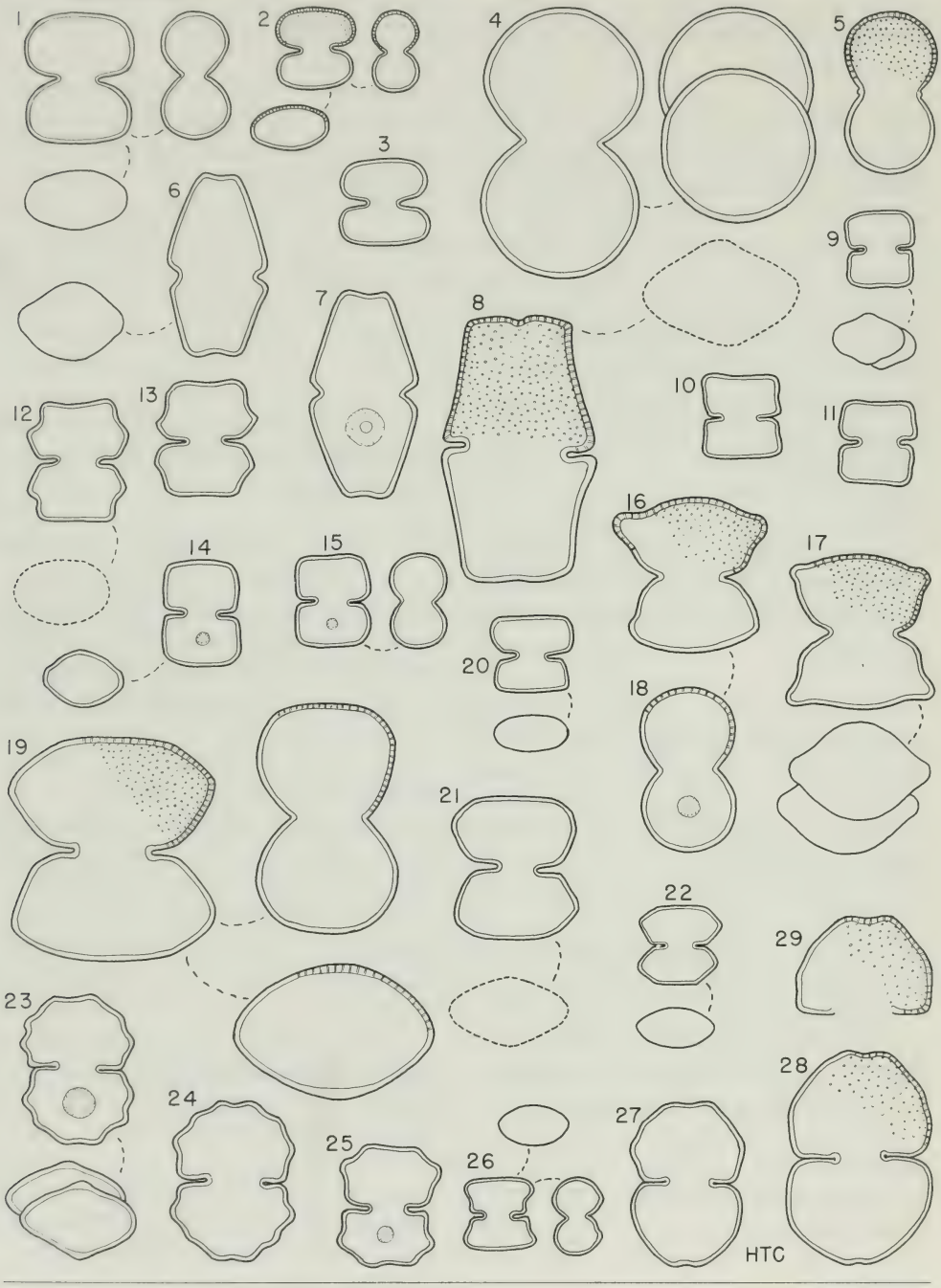
**Stations**
3-c, 4-c, 5-r, 12-c, 13-c, 30-c, 34-cc, 36-cc, 55-r.

---

*Cosmarium planogranatum* Croasdale 1962: 29, pl. IV, figs. 59-61
Plate XVI, figs. 1, 2

Cells 25-34 $\mu$ × 20-29 $\mu$ (1.0-1.35 ×), isthmus 6-13 $\mu$, thickness 14-18 $\mu$. Cells elliptic-reniform, with large flat granules evenly but irregularly distributed over the surface; 12 to 16 (usually 14) crenae around margin of semicell. Semicell in lateral view circular, in vertical view broadly ovate.

## Plate XIV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**Habitat**
Everywhere in tarns, all sizes of ponds and once in a creek; one of the commonest desmids in the Ellesmere material. July, August.

**Stations**
3-r, 9-r, 10-o, 12-c, 13-rr, 18-r, 19-r, 21A-o, 27-o, 30-cc, 33-r, 34-cc, 35-o, 36-c, 39-r, 42-o, 50-r, 55-r, 76-r, 79-r, 79A-r.

---

*Cosmarium pokornyanum* (Grunow) West and West var. *pokornyanum*
Plate XII, fig. 26

Cells 34-38 $\mu$ × 18-21 $\mu$ (1.8-1.9×), isthmus 9-12 $\mu$, wall smooth or punctate. Cells nearly twice as long as broad, semicells trilobed with sides of both upper and lower parts nearly parallel, isthmus broad, apex slightly indented.

**Habitat**
In squeezings from moss at edge and in bottom material of tarns, all sizes of ponds and a seepage area. July, August.

**Stations**
4-r, 9-o, 12-o, 13-rr, 28-r, 30-r, 31-c, 33-r, 35A-r, 39-c, 42-o, 55-o, 76-r, 79-r.

---

**Plate XIV (all ×1050)**

**Figure**

1
*COSMARIUM BIOCULATUM* Bréb. var. *BIOCULATUM*, 86

2,3
*COSMARIUM BIOCULATUM* Bréb. var. *DEPRESSUM* (Schaarschm.) Schmidle *f. MINUS* Schmidle, 86

4
*COSMARIUM MONILIFORME* (Turp.) Ralfs, 93

5
*COSMARIUM MONILIFORME* (Turp.) Ralfs f. *PUNCTATUM* Lagerh., 94

6,7
*COSMARIUM ANCEPS* Lund., 85

8
*COSMARIUM ANCEPS* Lund. f. **ARCTICUM** f. n., 85

9-11
*COSMARIUM NORIMBERGENSE* Reinsch f. *BOLDTII* Messik., 94

12,13
*COSMARIUM QUADRATULUM* (Gay) de Toni, 100

14,15
*COSMARIUM EXIGUUM* Arch. var. *SUBRECTANGULUM* West and West, 88

16-18
*COSMARUM CAPITULUM* Roy and Biss. var. *GROENLANDICUM* Børges., 86

19
*COSMARIUM PSEUDOPROTUBERANS* Kirchn. var. *PSEUDOPROTUBERANS*, 98

20
*COSMARIUM PSEUDOPROTUBERANS* Kirchn. var. *ALPINUM* Racib., 99

21
*COSMARIUM PSEUDOPROTUBERANS* Kirchn. var. *KOSSINSKAIAE* Krieg. and Gerl., 99

22
*COSMARIUM ABBREVIATUM* Racib. morpha, 85

23,24
*COSMARIUM IMPRESSULUM* Elfv. var. *SUBORTHOGONUM* Taft, 93

25
*COSMARIUM REGNELLII* Wille morpha, 101

26
*COSMARIUM REGNELLII* f. *MINUS* Boldt, 101

27
*COSMARIUM LAEVE* Rabenh. morpha 1, 93

28,29
*COSMARIUM LAEVE* Rabenh. morpha 2, 93

*Cosmarium pokornyanum* (Grun.) West and West var. *pokornyanum* morpha
Plate XII, fig. 27

Cells 32-33 $\mu$ × 21-24 $\mu$ (1.4-1.5×), isthmus 11-14 $\mu$, thickness 16-17 $\mu$, wall punctate. Cells differ in being smaller and relatively shorter.

**Habitat**
In open water in squeezings from moss at edge of tarn and creek. July.
**Stations**
12-r, 50-c.

---

*Cosmarium pokornyanum* (Grun.) West and West var. *groenbladii* Förster 1963: 50, pl. I, fig. 18
Plate XII, fig. 28

Cell 34 $\mu$ × 19 $\mu$ (1.8 ×), isthmus 10 $\mu$, wall finely punctate. Cell differs in that the sides diverge toward the apex.

**Habitat**
In squeezings from moss at edge of tarn. August.
**Station**
30-r.

---

*Cosmarium pokornyanum* (Grun.) West and West var. *taylorii* Grönblad 1952: pl. I, fig. 9
Plate XII, figs. 29, 30

Cells 27-39 $\mu$ × 19-24 $\mu$ (1.5-1.7×), isthmus 10-13 $\mu$, thickness 12-15.5 $\mu$, wall smooth or punctate. Semicells more pyramidal than trilobed, upper part with sides converging toward a broad, shallowly notched apex.

**Habitat**
In squeezings from moss at edge and bottom of tarns and all sizes of ponds; more common than the type. July, August.

**Stations**
1-r, 4-c, 13-r, 18-r, 21A-c, 30-c, 34-cc, 36-o, 39-r, 42-r, 83-r.

---

*Cosmarium pseudoholmii* Borge 1913: 22, pl. II, fig. 21
Plate XV, fig. 2

Cells 58-74 $\mu$ × 51-64 $\mu$ (1-1.27 ×), isthmus 16-30 $\mu$ wide, 3-8 $\mu$ long, thickness 27-33 $\mu$.

**Habitat**
Commonest in open water but also in squeezings from moss at edge of tarns and permanent ponds; very common. July.

**Stations**
1-c, 10-rr, 13-r, 17-rr, 18-rr, 30-o, 34-r, 35-r, 36-cc, 38-r, 39-o, 79-r.

---

*Cosmarium pseudonitidulum* Nordst. var. *validum* West and West
Plate XII, fig. 32

Cells 56-58 $\mu$ × 40 $\mu$ (1.4-1.45 ×), isthmus 20 $\mu$, wall firm and closely punctate. Cells truncate-elliptic, basal angles less rounded than in type; two pyrenoids.

**Habitat**
In squeezings from moss at edge and from bottom of tarns. July.
**Stations**
12-r, 30-r.

---

*Cosmarium pseudoprotuberans* Kirchner var. *pseudoprotuberans*
Plate XIV, fig. 19

Cells (23) 30-33 $\mu$ × (21) 25-27 $\mu$, isthmus (7) 9-12 $\mu$, thickness 18-20 $\mu$, wall smooth or faintly punctate.

Semicells transversely subhexagonal-elliptic with sides diverging and apex slightly convex; in vertical view tumid. The small specimen seems to form a link between the type and var. *kossinskaiae* Krieg. and Gerl.

**Habitat**
In squeezings from moss at edge of a tarn and mostly permanent ponds. July, August.

**Stations**
21A-c, 31-r, 34-r, 39-r, 55-r, 79-o, 79A-cc.

---

*Cosmarium pseudoprotuberans* Kirchner var. *alpinum* Racib.
Plate XIV, fig. 20

Cells 11 $\mu$ × 9-12 $\mu$, isthmus 4-5 $\mu$, thickness 5-6 $\mu$, wall smooth. Cells much smaller than type and less swollen in vertical view.

**Habitat**
From bottom material and in squeezings from moss at edge of tarns. July.
**Stations**
30-r, 36-r.

---

*Cosmarium pseudoprotuberans* Kirchner var. *kossinskaiae* Krieger and Gerloff 1965: 232, pl. 41, fig. 11
Plate XIV, fig. 21

Cells 13-19 $\mu$ × 13-17.5 $\mu$, isthmus 4-6 $\mu$, wall smooth or punctate. Cells about one half the size of the type, somewhat swollen in vertical view.

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds. July.
**Stations**
5-o, 12-o, 18-rr, 30-r.

---

*Cosmarium pulcherrimum* Nordst. var. *boreale* Nordstedt 1872: 32, pl. VI, fig. 14
Plate XVI, fig. 26

Cells 49-50 $\mu$ × 33-36 $\mu$ (1.39-1.45×), isthmus 16-17 $\mu$. The Ellesmere plants are somewhat smaller than Nordstedt's but agree well with those found in Franz Josef Land by Kossinskaia (1933: 42, pl. III, fig. 2).

**Habitat**
In squeezings from moss at edge of permanent pond, and on a mountain slope. July.

**Stations**
21A-r, D-r.

---

*Cosmarium punctulatum* Bréb. var. *punctulatum* f. **arcticum** f.n.
Plate XVI, figs. 5-8

*Cellulae 36-45 $\mu$ long., 30-42 $\mu$ lat. (1.05-1.26 ×), 8-14 $\mu$ lat. isth., 17-22.5 $\mu$ crass. Cellulae maiores, apex magis rotundatus; granula media maiora atque magis applanata, regione levi inter granula media atque intramarginalia ut in var.* subpunctulato; *pyrenoides una. Specimen typicum apud muscos in stagno permanente num. 28 dicto, d. 11, m. Aug., 1965, a. D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 67-28-174a, isotype presumably in vial No. A28; both deposited in the National Museum of Natural Sciences, Ottawa.

Cells larger, with apex more rounded; median granules larger and flatter, often with a smooth area between them and the intramarginal granules, as in var. *subpunctulatum* (Nordst.) Børgesen; one pyrenoid.

**Habitat**
Everywhere in tarns and all sizes of ponds; one of the commonest desmids in the Ellesmere collections. June, July, August.

**Stations**
1-o, 4-r, 6-r, 9-r, 10-r, 12-o, 13-cc, 17-r, 18-c, 19-c, 21A-cc, 21B-r, 28-cc, 30-r, 31-c, 33-o, 34-cc, 35-cc, 36-cc, 38-r, 39-o, 43-r, 78-o, 79-o, 79A-c, B-r.

---

*Cosmarium punctulatum* Bréb. var. *subpunctulatum* (Nordst.) Børges.
Plate XVI, figs. 9-11

Cells 28-34 $\mu$ × 24-31 $\mu$ (1-1.24×), isthmus 7-11 $\mu$, thickness 15-16 $\mu$, apex granulate, one pyrenoid.

**Habitat**
In squeezings from moss at edge and bottom of tarns and mostly permanent ponds, also in open water; common and variable. July, August.

**Stations**
3-r, 4-r, 10-o, 12-c, 13-c, 28-r, 30-cc, 34-c, 35-r, 39-r, 79-o, 79A-r, B-o, C-r.

---

*Cosmarium quadratulum* (Gay) de Toni 1889: 934
Plate XIV, figs. 12, 13

Cells 14-17 $\mu$ × 11-14 $\mu$ (1.2-1.3×), isthmus 4-5 $\mu$, wall smooth. This plant closely resembles the *Euastrum insulare* var. *silesiacum* f. *minus* but differs in its broadly ovate ventral view and in the straight lower half of the semicell wall. It differs from the *Cosmarium regnelli* morpha in its broader, not elevated apex.

**Habitat**
In squeezings from edge and bottom of tarn. July, August.

**Station**
34-o.

---

*Cosmarium quadratum* Ralfs f. **boreale** f.n.
Plate XIII, fig. 12

*Cellulae 56-73 $\mu$ long., 31-40 $\mu$ lat. (1.58-1.87×), 19-25 $\mu$ lat. isth., 24-28 $\mu$ crass. Forma a planta typica differens ut maior crassiorque, necnon sinum clausum atque membranam saepe punctatam habet; latera semicellulae paululum retusa, apex convexus, anguli basales rotundati; pyrenoides duae. Haec forma plantis in materia a locis Alaska, Devon Island et Labrador dictis ab auctore visis similis. Specimen typicum apud muscos in stagno magno permanente num. 19 dicto, d. 25, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 66-19-141 b, isotype presumably in vial No. A141: both deposited in the National Museum of Natural Sciences, Ottawa.

This form differs from the type, and agrees with plants seen by the author in material from Alaska, Labrador and Devon Island, in its generally larger size, stouter proportions, closed sinus and often punctate wall. The sides of the semicells are slightly retuse, the apex is convex and the basal angles rounded, and there are 2 pyrenoids.

**Habitat**
In squeezings from moss at edge and bottom, also in open water of tarns and ponds of all sizes; common but never abundant. July, August.

**Stations**
1-r, 3-o, 4-o, 5-r, 6-r, 9-r, 11-r, 12-r,

19-r, 28-r, 31-r, 34-r, 35-r, 36-o, 37-r, 38-o, 39-r, 42-o, 79-r, 79A-r.

---

*Cosmarium quadratum* Ralfs f. *willei* West and West
Plate XIII, fig. 13

Cells 55-70 $\mu$ × 30-42 (1.5-1.83 ×), isthmus 18-26 $\mu$, thickness c. 28 $\mu$. Sides of semicells straight or slightly convex, wall punctate, 2 pyrenoids.

**Habitat**
In squeezings from moss at edge and bottom of larger ponds and a tarn. July.

**Stations**
13-rr, 21A-o, 28-r, 31-r, 36-o, 38-c, 42-r.

---

*Cosmarium quasillus* Lund. morpha
Plate XV, fig. 3

Cells 67-75 $\mu$ × 60-65 $\mu$ (1.1-1.2 ×), isthmus 15-19 $\mu$, thickness 33-38 $\mu$. A form approaching *C. subquasillus* Boldt (1888: 25, pl. I, fig. 25) in its less elevated apex and in the bigranulate upper crenae. The Ellesmere plant forms a link between them, indicating perhaps that *C. subquasillus* might better be reduced to a variety of *C. quasillus*.

**Habitat**
In squeezings from moss at edge of tarns. July, August.
**Stations**
30-c, 36-c.

---

*Cosmarium rectangulare* Grun. var. *croasdaleae* Förster 1963: 51, pl. I, fig. 14
Plate XIII, fig. 11

Cells 45-53 $\mu$ × 38-44 $\mu$ (1.16-1.36 ×), isthmus 11-18 $\mu$, thickness 26-32 $\mu$, wall punctate. Semicells rather rectangular, but with sides diverging from isthmus; 2 (rarely 1) pyrenoids. The Ellesmere plants differ from Förster's in their larger size and in the fact that the cell wall is not especially thickened at apex and sides, as seen in face view.

**Habitat**
In squeezings from moss at edge and bottom of mostly permanent ponds and a tarn. July, August.

**Stations**
9-r, 13-c, 21A-c, 28-c, 31-o, 33-r, 34-r, 42-o.

---

*Cosmarium regnellii* Wille morpha
Plate XIV, fig. 25

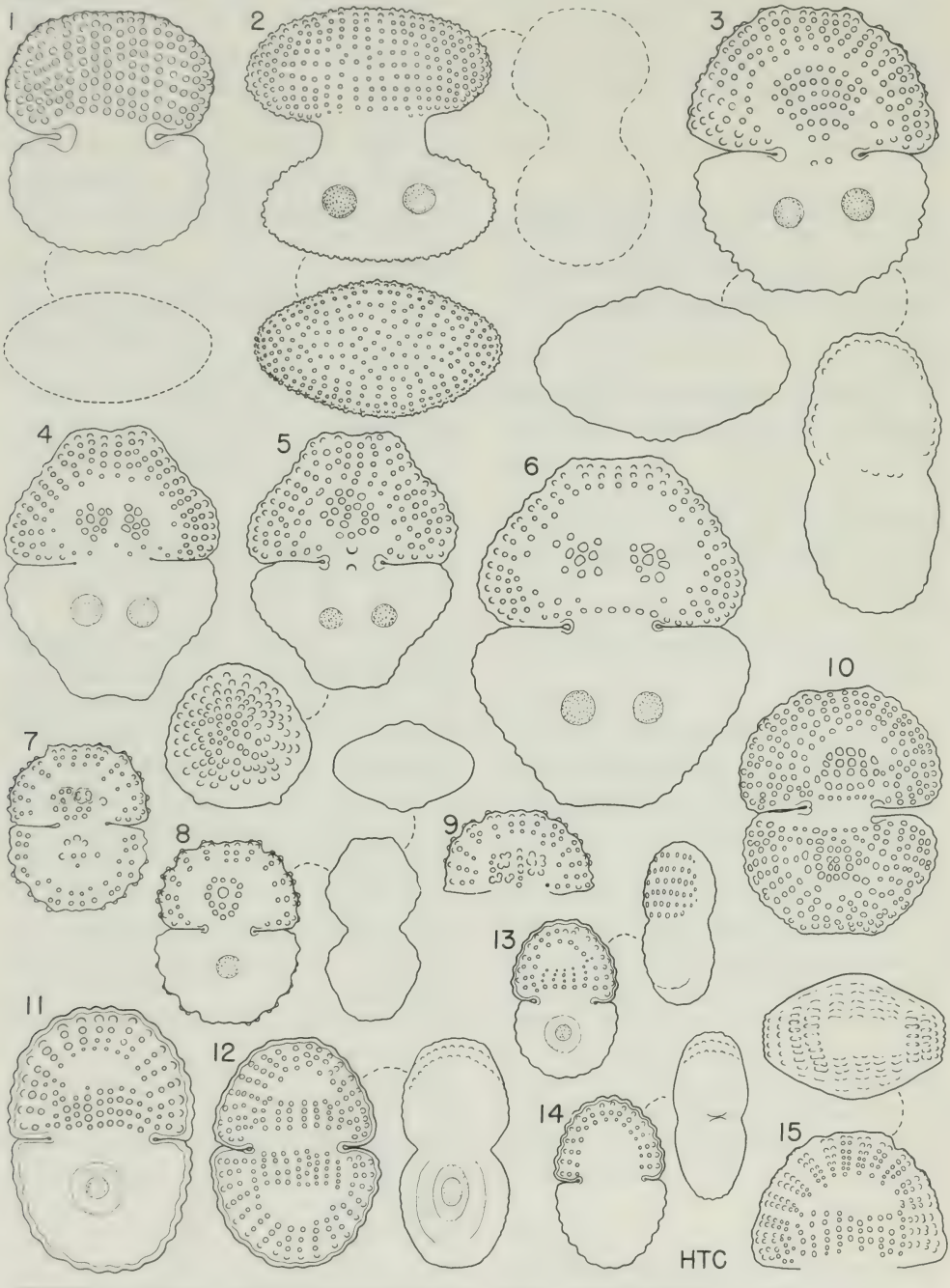
Cell 16 $\mu$ × 14 $\mu$, isthmus 5 $\mu$, wall smooth. This plant differs from the type in its open sinus and somewhat smaller size, in this respect resembling a plant found by the author in Devon Island. It differs from the *C. quadratum* morpha and the *Euastrum insulare* var. *silesiacum* f. *minus* in the Ellesmere material, in its narrower and elevated apex.

**Habitat**
In squeezings from moss at edge of tarn. August.
**Station**
12-rr.

---

*Cosmarium regnellii* f. *minus* Boldt 1885: 103, pl. V, fig. 8
Plate XIV, fig. 26

Cells 10 $\mu$ × 9-10 $\mu$, isthmus 3 $\mu$, thickness 6 $\mu$, wall smooth. The Ellesmere plant differs from Boldt's form in its flatter apex. It is similar to the plants reported by the author from Alaska and Labrador.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**Habitat**
In bottom material and in squeezings from moss at edge of a tarn and permanent pond. June, July.

**Stations**
4-r, 18-r.

---

*Cosmarium reniforme* (Ralfs) Arch.
Plate XV, fig. 1

Cells 56-68 μ × 49-50 μ (1.14-1.16×), isthmus 20-21 μ.

**Habitat**
With other algae. August.

**Station**
B-r.

*Cosmarium* **septentrionale** sp. n.
Plate XV, figs. 7-9

*Cellulae 34-45 μ long, 28-37 μ lat. (1.1-1.25 ×), 9-13 μ lat. isth., 20-24 μ crass. Semicellulae depresso-pyramidales, apice truncato, sinu lineari clausoque; margo 4 crenas bigranulatas perspicuas unoquoque in latere atque 4 crenas minores ad apicem praebens; superficies 3 series granulorum radiantes concentricas intra marginem, extimis interdum binis, necnon granula media maiora quasi in circulo, interdum, autem, in ordinibus verticalibus disposita praebens; pyrenoides una; semicellula a vertice visa late ovata, tumorem medium latum habens. Haec species*

---

**Plate XV (all ×555)**

**Figure**

1
*COSMARIUM RENIFORME* (Ralfs) Arch., 103

2
*COSMARIUM PSEUDOHOLMII* Borge, 98

3
*COSMARIUM QUASILLUS* Lund. morpha, 101

4
*COSMARIUM TURPINII* Bréb. var. *TURPINII*, 108

5
*COSMARIUM TURPINII* Bréb. var. *EXIMIUM* West and West, 108

6
*COSMARIUM TURPINII* Bréb. var. *PODOLICUM* Gutw., 109

7-9
*COSMARIUM* **SEPTENTRIONALE** sp. n., 103

10
*COSMARIUM FORMOSULUM* Hoff var. *NATHORSTII* (Boldt) West and West, 88

11,12
*COSMARIUM SPECIOSUM* Lund. var. *SPECIOSUM*, 104

13
*COSMARIUM SPECIOSUM* Lund. var. *SPECIOSUM* f. *MINUS* Först., 105

14
*COSMARIUM SPECIOSUM* Lund. var. *SIMPLEX* Nordst., 105

15
*COSMARIUM SPECIOSUM* Lund. var. *BIFORME* Nordst., 105

C. subcostato *satis similis, differens, autem, ut maior et pyrenoidem singulam habet, et semicellula a latere visa protuberationem superiorem praebet. Specimen typicum apud muscos in lacu Skeleton Lake num. 34 dicto, d. 4, m. Jul., 1965, a D. R. Oliver lectum.*

**Holotype**
On microscope slide No. 67-34-23a, isotype presumably in vial No. A23; both deposited in the National Museum of Natural Sciences, Ottawa.

Semicells depressed-pyramidal with truncate apex and linear, closed sinus; margin with 4 clearly defined bigranulate crenae on each side and 4 smaller ones at apex; surface showing 3 concentric radiating series of granules within the margin, the outermost ones of which may be paired, and a median group of larger granules arranged roughly in a circle, but also sometimes in vertical rows; one pyrenoid; semicell in vertical view broadly oval with broad median tumour. This species rather resembles *C. subcostatum,* but differs in its larger size, its single pyrenoid, and, in lateral view, in having the median protuberance higher.

Included in this species should be the *C. subcostatum* Nordst. forma from Alaska (Croasdale 1956: 53, pl. 15, figs. 21-23), and probably also, because of the larger size (although no mention is made of the chloroplast number), the forms of *C. subcostatum* shown by Taylor (1934: 226, pl. 55, fig. 12) from Newfoundland, and by Skuja (1964: 221, pl. 39, fig. 3) from Abisko (Lappland).

**Habitat**
Once from open water, but mostly in squeezings from moss at edge of tarns and permanent ponds. July, August.

**Stations**
3-r, 4-r, 5-o, 12-o, 30-c, 34-cc, 36-r, 38-r, 39-r, C-r.

---

*Cosmarium sexnotatum* Gutw. var. *tristriatum* (Lütkemuller) Schmidle
Plate XVI, figs. 15-17

Cells 22-27 $\mu$ × 20-27 $\mu$, isthmus 6-10 $\mu$, thickness 13-15 $\mu$. Semicells pyramidate with 4-crenate sides converging rather sharply to a flattened 4-crenate apex; crenae on sides truncate to bigranulate; median tumour bearing 3 to 5 (usually 3) elongate granules, each with a smaller granule below it; sinus linear, closed.

**Habitat**
In all wet situations but usually in squeezings from moss at edge of tarns and permanent ponds; very common. June, July, August.

**Stations**
3-r, 4-r, 5-r, 12-cc, 13-o, 18-o, 21A-r, 30-r, 32-r, 34-cc, 35-o, 35A-o, 36-cc, 39-o, 78-rr, 79A-r, C-r.

---

*Cosmarium speciosum* Lund. var. *speciosum*
Plate XV, figs. 11, 12

Cells 50-66 $\mu$ ×28-47 $\mu$ (1.3-1.67 ×), isthmus 14-27 $\mu$, thickness 19-29 $\mu$. Semicells pyramidate with flattened apex; margin crenate, granules in concentric and radial rows within margin, also in vertical rows above the broad isthmus; in vertical view elliptic.

**Habitat**
Once in open water but mostly in

squeezings from moss at edge and bottom of tarns, all sizes of ponds and in creeks; very common. July, August.

**Stations**
1-r, 4-r, 6-r, 10A-r, 12-o, 21A-o, 28-o, 30-o, 31-r, 33-r, 34-c, 35-o, 36-r, 37-r, 38-r, 39-r, 42-c, 50-cc, 76-r, 78-r, 79-r, 79A-r.

---

*Cosmarium speciosum* Lund. var. *speciosum* f. *minus* Förster 1965*b*: 48, pl. IV, fig. 14
Plate XV, fig. 13

Cells 40-50 $\mu$ × 19-32 $\mu$ (1.48-1.65×), isthmus 14-19 $\mu$, thickness c. 18 $\mu$. The Ellesmere plants are somewhat larger than Förster's form.

**Habitat**
In squeezings from moss at edge of tarns and a permanent pond. July, August.
**Stations**
30-c, 31-o, 34-c, 36-o.

---

*Cosmarium speciosum* Lund. var. *biforme* Nordst.
Plate XV, fig. 15

Cells 55-70 $\mu$ × 39-54 $\mu$ (1.33-1.6×), isthmus 25-27 $\mu$, thickness 25-31 $\mu$. Differs from type in the larger size, in having all but the lowest crenae bigranulate and the intramarginal granules paired; tumid in vertical view.

**Habitat**
In squeezings from moss at edge, bottom and shore of tarns and permanent ponds, once in a creek. July, August.

**Stations**
1-r, 12-r, 27-r, 28-o, 30-c, 31-r, 34-r, 35-r, 36-r, 39-r, 50-r, 79-o, B-r.

---

*Cosmarium speciosum* Lund. var. *simplex* Nordst.
Plate XV, fig. 14

Cells 35-57 $\mu$ × 23-41 $\mu$ (1.37-1.65×), isthmus 12-24 $\mu$, thickness 16-22 $\mu$. Semicells rather small with apices rounded and tapered, all crenations and granules simple, vertical series of granules above isthmus very indistinct or absent.

**Habitat**
In all kinds of wet places, but mostly in squeezings from moss at edge of tarns and all sizes of ponds, and a creek. July, August.

**Stations**
1-r, 3-r, 4-r, 9-o, 10-rr, 12-c, 13-o, 18-r, 27-r, 30-c, 34-r, 36-r, 37-r, 39-r, 42-o, 49A-r, 50-c, 50A-r, 79-o.

---

*Cosmarium subcrenatum* Hantzsch var. *isthmochondrum* Messikommer 1938: 179, pl. V, fig. 69
Plate XVI, figs. 18-20

Cells 32-36 $\mu$ × 25-28 $\mu$ (1.27-1.28×), isthmus 8-9 $\mu$. Differs from var. *subcrenatum* in its slightly protracted apex and supraisthmial papilla; one pyrenoid.

**Habitat**
In squeezings from moss at edge of tarns. July, August.

**Stations**
12-r, 34-r, B-r.

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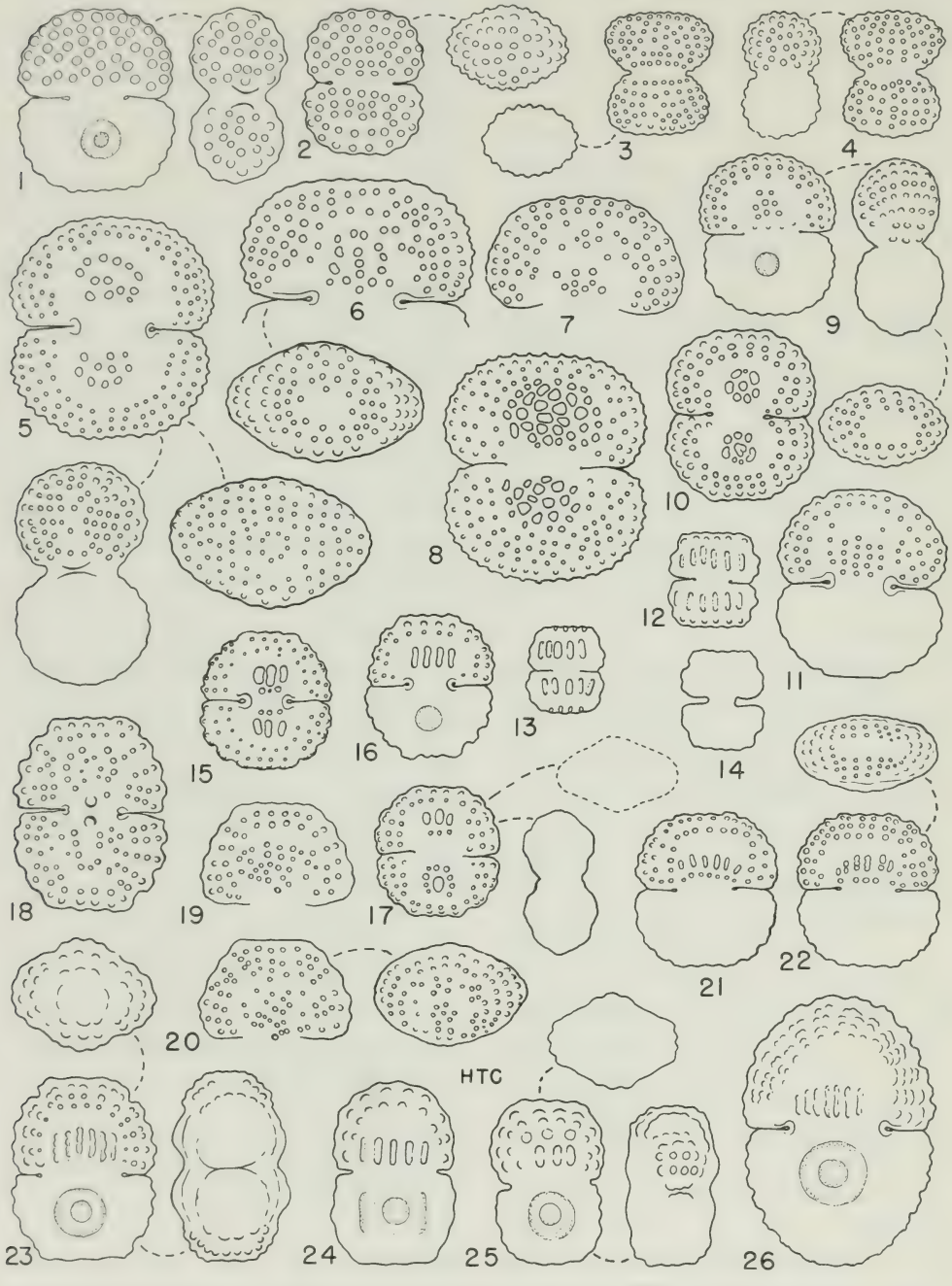
*Cosmarium subcucumis* Schmidle f. *boreale* Croasdale 1956: 53, pl. IV, figs. 2, 3 morpha
Plate XII, fig. 12

## Plate XVI



Cells 59-65 μ × 36-42 μ (1.55-1.64 ×), isthmus 21-23 μ. Cells large, broadly elliptic, sinus linear, apex convex; wall smooth or finely punctate; 2 pyrenoids. Differs from type in broader isthmus and closed sinus.

**Habitat**
In squeezings from moss in tarn, and on shore of permanent pond. July.
**Stations**
34-r, 79-r.

---

*Cosmarium subeductum* Gutw. var. **oliveri** var. n.
Plate XVIII, figs. 1, 2

*Cellulae 48-70 μ long., 31-43 μ lat. (1.36-1.67 ×), 11-22 μ lat. isth., 24-32 μ crass. Cellulae aliquanto maiores atque relative longiores quam plantae typicae, apice rotundato elevatoque; margo crenatus, ordine 3-4 granulorum magnorum ab omni crena versus partem semicellulae mediam inornatam extendente praeditus; semicellula a vertice visa late elliptica. Planta similis in collectionibus ex Insula Devonis ab auctore reperta. Specimen typicum apud muscos in lacu num. 10 dicto, d. 21, m. Jul., 1965, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 66-10-71a, isotype presumably in vial No. A71; both deposited in the National Museum of Natural Sciences, Ottawa. This variety is named in honour of Dr. D. R. Oliver, who made most of the collections upon which this paper is based.

Cells considerably larger and relatively longer than the type, with rounded elevated apex; margin crenate, with a row of 3 to 4 large granules extending from each crena toward the unornamented middle of the semicell; wall thick; semicell in vertical view broadly elliptic. A si-

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**Plate XVI (all × 730)**

**Figure**

1,2
*COSMARIUM PLANOGRANATUM* Croasd., 95

3,4
*COSMARIUM WITTROCKII* Lund., 109

5-8
*COSMARIUM PUNCTULATUM* Bréb. var. *PUNCTULATUM* f. **ARCTICUM** f. n., 99

9-11
*COSMARIUM PUNCTULATUM* Bréb. var. *SUBPUNCTULATUM* (Nordst.) Børges., 100

12-14
*COSMARIUM HUMILE* (Gay) Nordst. var. *LACUSTRE* Taylor, 93

15-17
*COSMARIUM SEXNOTATUM* Gutw. var. *TRISTRIATUM* (Lütkem.) Schmidle, 104

18-20
*COSMARIUM SUBCRENATUM* Hantzsch var *ISTHMOCHONDRUM* Messik., 105

21,22
*COSMARIUM NORWEGICUM* Strøm, 94

23
*COSMARIUM COSTATUM* Nordst. f. *MINUS* Boldt, 88

24,25
*COSMARIUM CRENATUM* Ralfs, 88

26
*COSMARIUM PULCHERRIMUM* Nordst. var. *BOREALE* Nordst., 99

milar plant was found by the author in collections from Devon Island.

**Habitat**
Once taken from open water, but mostly in squeezings from moss at edge and bottom of tarns and large ponds. June, July.

**Stations**
1-r, 9-r, 10-rr, 12-c, 18-r, 30-c, 34-c, 36-r, 39-o, 42-o.

---

*Cosmarium subgranatum* (Nordst.) Lütkem.
Plate XII, fig. 25

Cells 21-33 $\mu$ × 14-25 $\mu$ (1.3-1.6×), isthmus 3-9 $\mu$, thickness 10-14.5 $\mu$.

**Habitat**
Principally in squeezings from moss at edge of tarns and large ponds; variable and very common. June, July, August.

**Stations**
5-c, 12-c, 13-cc, 30-r, 32-cc, 33-r, 34-r, 36-o, 39-o, 79-c.

---

*Cosmarium subtumidum* Nordst. var. *groenbladii* Croasd. in Croasdale and Grönblad 1964: 187, pl. XI, figs. 26, 27
Plate XII, fig. 31

Cell 44 $\mu$ × 40 $\mu$, isthmus 13 $\mu$, thickness 26 $\mu$, wall punctate. Semicells more depressed than those of type, and more tumid in ventral view.

**Habitat**
In squeezings from moss at edge of permanent pond. July.
**Station**
13-r.

---

*Cosmarium tetraophthalmum* Bréb.
Plate XVII, fig. 1

Cells 94-99 $\mu$ × 60-66 $\mu$ (1.45-1.5×), isthmus 23-25 $\mu$. Cells large, semicells pyramidate-ovate with narrow isthmus; wall coarsely granulate, granules becoming smaller and disappearing toward the middle of the cell; wall punctate between the granules; 2 pyrenoids.

**Habitat**
In squeezings from moss at edge of tarns. July, August.

**Stations**
30-r, 35-r.

---

*Cosmarium turpinii* Bréb. var. *turpinii*
Plate XV, fig. 4

Cells 65-67 $\mu$ × 50-52 $\mu$ (1.3×), isthmus 12-17 $\mu$. Semicells pyramidate-trapeziform, coarsely granular, with 2 median tumours. This form has the apex more excavate than in the type. Thomasson (1962: 455, fig. 6) shows a plant with even deeper apical excavation, but otherwise quite different, having relatively greater length and fewer marginal granules.

**Habitat**
In squeezings from moss at edge of tarn and permanent pond. July.

**Stations**
34-r, 39-r.

---

*Cosmarium turpinii* Bréb. var. *eximium* West and West.
Plate XV, fig. 5

Cells 52-68 $\mu$ × 47-55 $\mu$ (1.1-1.3×), isthmus 12-17 $\mu$, apex c. 21 $\mu$, thick-

ness c. 27-35 μ. A smaller plant, semicells with a single median tumour, and with a single large granule at isthmus.

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds; the commonest variety of this species in the Ellesmere collections. July, August.

**Stations**
12-r, 13-c, 30-r, 34-o, 35-r, 36-r, 39-r, B-o.

---

*Cosmarium turpinii* Bréb. var. *podolicum* Gutw.
Plate XV, fig. 6

Cells 84-85 μ × 67 μ (1.25-1.27 ×), isthmus c. 22 μ. Cells larger than type, semicells with 2 to 3 emarginate to bigranular crenations below the apex.

**Habitat**
In squeezings from moss at edge and bottom of tarn. July, August.

**Station**
34-r.

---

*Cosmarium tyrolicum* (Nordst.) Krieger and Gerloff 1962: 47, pl. XII, fig. 12 (*C. cymatopleurum* Nordst. var. *tyrolicum* Nordst.)
Plate XIII, fig. 9

Cells 112-115 μ × 74-80 μ (1.4-1.5 ×), isthmus 30-37 μ, wall relatively thick. Two specimens seen.

**Habitat**
In squeezings from moss at the edge and bottom of large ponds. July.

**Stations**
33-r, 42-r.

*Cosmarium undulatum* Corda var. *alaskanum* Croasdale 1956: 58, pl. III, fig. 8
Plate XII, fig. 11

Cells 30-33 μ × 23-25 μ (1.3-1.4 ×), isthmus 6-8 (12) μ, wall smooth. Outline of cells in face view very similar to var. *alaskanum,* but cells smaller; other views not seen.

**Habitat**
In squeezings from moss at edge of permanent ponds and a tarn. July, August.

**Stations**
4-o, 34-o, 79-r.

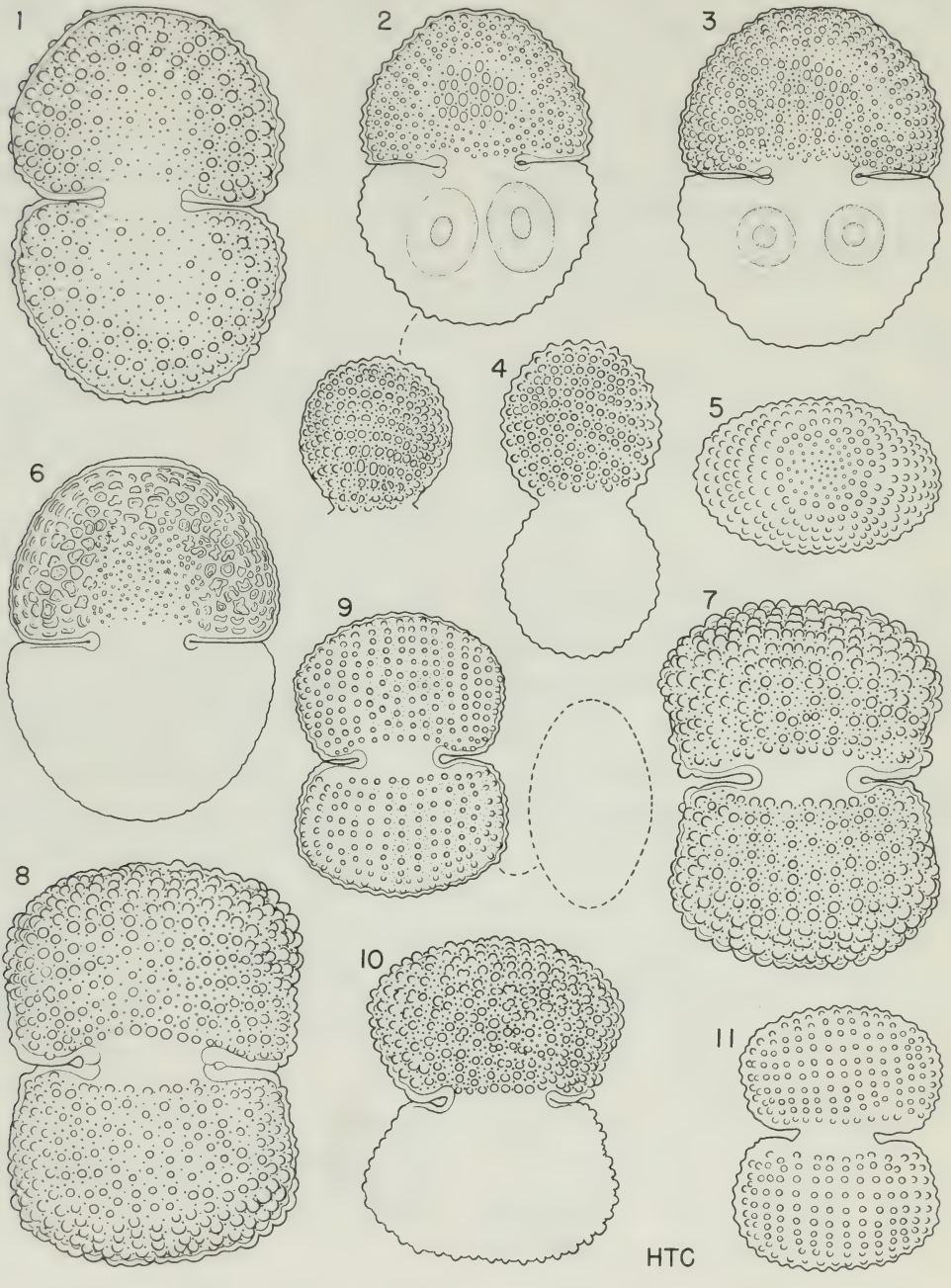
---

*Cosmarium wittrockii* Lund.
Plate XVI, figs. 3, 4

Cells 18-24 μ × 16-20.5 μ (1.12-1.3 ×), isthmus 8-11 μ, thickness 12-15 μ. Cells transversely subelliptic, with greatest breadth near the apex of the cell; wall with relatively large granules in irregular horizontal and vertical series.

**Habitat**
In squeezings from moss, principally at edge but also from bottom of tarns and permanent ponds; common. July, August.

**Stations**
3-o, 4-o, 13-r, 21A-c, 28-o, 30-r, 34-o, 35-r, 36-r, 38-r, 79-r.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## *STAURODESMUS* Teiling 1948

**Key to the species found on Ellesmere Island**

1 Lateral angles bluntly rounded ..... *S. pachyrhynchus*
1 Lateral angles acute ..... *S. spetsbergensis*

*Staurodesmus pachyrhynchus* (Nordstedt) Teiling 1967: 499, pl. III, figs. 9-11 var. *pachyrhynchus*
Plate XVIII, fig. 4

Cells 38-40 $\mu$ × 36-39 $\mu$, isthmus 9-10 $\mu$, wall smooth. Semicell subelliptic with angles blunt and somewhat knob-like, isthmus narrow, sinus acute and open.

**Habitat**
In open water of tarn. July.
**Station**
36-r.

*Staurodesmus pachyrhynchus* (Nordstedt) Teil. var. *pseudopachyrhynchus* (Wolle) Teiling 1967: 501, pl. III, fig. 17
Plate XVIII, figs. 5, 6

Cells 30-36 $\mu$ × 26-30 $\mu$, isthmus 5-8 $\mu$, wall smooth. Differs in that it has a more elongated isthmus and lateral angles that are not knob-like.

**Habitat**
In squeezings from moss at bottom of tarn. August.

**Station**
34-r.

*Staurodesmus spetsbergensis* (Nordstedt) Teiling 1967: 496, f. *evoluta* Teiling 1967: 496, pl. II, figs. 10, 11
Plate XVIII, fig. 3

Cells 34-42 $\mu$ × 31-40 $\mu$, isthmus 10-13 $\mu$, wall punctate. Semicells in front view broadly cup-shaped, the ventral margins more curved than the apex, the lateral angles acute and thickened.

**Habitat**
In open water and in squeezings from moss at edge and bottom of tarn, also in a seepage area. July, August.
**Stations**
30-cc, 35A-r, 36-c.

**Plate XVII (all × 555)**

**Figure**

1
*COSMARIUM TETRAOPHTHALMUM* Bréb., 108

2-5
*COSMARIUM HORNAVANENSE* Gutw. var. *ARCTICUM* Croasd., 92

6
*COSMARIUM OCHTHODES* Nordst. var. *AMOEBUM* W. West, 95

7-8
*COSMARIUM CONSPERSUM* Ralfs var. *CONSPERSUM* f. **DICKIEI** comb. n., 87

9
*COSMARIUM CONSPERSUM* Ralfs var. *CONSPERSUM* f. *MINUS* Racib., 87

10
*COSMARIUM CONSPERSUM* Ralfs var. *LATUM* (Bréb.) West and West morpha, 87

11
*COSMARIUM CONSPERSUM* Ralfs var. *LATUM* (Bréb.) West and West f. *PARVUM* Croasd., 88

## *STAURASTRUM* 1829 Meyen emend Ralfs

### Key to the species found on Ellesmere Island

| | | |
|---|---|---|
| 1 | Lateral margins of semicells not extended into processes | 2 |
| 1 | Lateral margins of semicells extended into processes | 7 |
| 2 | Wall smooth or punctate | *S. muticum* |
| 2 | Wall granular, spinose or verrucose | 3 |
| 3 | Semicells with 2 (rarely 1) horizontal circles of large verrucae, sinus a notch | *S. rhabdophorum* |
| 3 | Semicells ornamented with granules, spines or small verrucae | 4 |
| 4 | Cells large (more than 45 $\mu$ broad), surface covered with small spines | *S. brebissonii* |
| 4 | Wall ornamented with granules or verrucae | 5 |
| 5 | Ornamentation consisting of few circles of granules at angles only | *S. varians* |
| 5 | Ornamentation extending over whole surface of semicell | 6 |
| 6 | Ornamentation consisting of simple granules | *S. punctulatum* |
| 6 | Ornamentation consisting of verrucae or of granules grouped in twos and threes | *S. scabrum* |
| 7 | Semicells with spines at apex | *S. oxyacanthum* |
| 7 | Semicells without spines at apex | 8 |
| 8 | Cells mostly more than 30 $\mu$ long, processes horizontal | *S. borgeanum* |
| 8 | Cells mostly less than 30 $\mu$ long, processes converging | *S. cyrtocerum* |

*Staurastrum borgeanum* Schmidle 1898: 60, pl. III, fig. 7
Plate XVIII, fig. 21

Cells 40-44 $\mu \times 44$-50 $\mu$, isthmus 15-16 $\mu$. Semicells fusiform, extending into short processes tipped with 4 short spines; in face view with verrucae on dorsal margin, and granules in short vertical row across the face of the semicell and in an indistinct circle above the isthmus; in vertical view with regular intramarginal verrucae. Cells sometimes twisted at isthmus. Quite similar to forms seen in material from Cape Thompson, Alaska.

**Habitat**
On shore and in squeezings from moss at edge of tarns and a permanent pond. July, August.

**Stations**
34-r, 36-c, 79-o.

*Staurastrum borgeanum* Schmidle morpha
Plate XVIII, fig. 22

Cells 33-43 $\mu$ × (32) 37-43 $\mu$, isthmus 10-13 $\mu$. Cells somewhat smaller and more compact than the type, with the ornamentation slightly reduced, consisting more of granules than verrucae.

**Habitat**
In open water and in squeezings from moss at edge, bottom and shore of tarns, ponds of all sizes and a creek. July, August.

**Stations**
6-r, 21B-r, 27-r, 30-r, 31-r, 50-r, 79-o, 79A-r.

---

*Staurastrum brebissonii* Arch.
Plate XVIII, figs. 13, 14

Cells 44-57 $\mu$ × 48-65 $\mu$, isthmus 13-21 $\mu$. Cells large, broader than long; semicells trapeziform-elliptic with elevated, sometimes truncate apex, and acute wide-open sinus; wall covered with short spines. Semicell in vertical view with sides slightly concave; cell outline quite variable.

**Habitat**
In squeezings from moss at edge of permanent ponds, a temporary pond and a lake. July.

**Stations**
9-r, 18-rr, 21A-r, 31-r, A-r.

---

*Staurastrum cyrtocerum* Bréb.
Plate XVIII, figs. 17, 18

Cells 24-30 (38) $\mu$ × 26-38 (41) $\mu$, isthmus 7-8 $\mu$. Cells small, usually somewhat twisted at isthmus. Semicells cup-shaped with ventral margin more tumid than the dorsal; processes converging, shorter than body of semicell, in vertical view often seen to be bent in one direction. Semicells in vertical view ornamented with 1 to 2 pairs of granules between the processes; in face view smooth above the isthmus. This form resembles plants seen in material collected in Alaska (Croasdale 1957: 143, figs. 102, 103).

**Habitat**
In squeezings from moss at edge, bottom and shore of tarns and mostly permanent ponds; the commonest *Staurastrum* in the collections. July, August.

**Stations**
3-r, 4-r, 5-r, 12-c, 13-c, 21A-o, 27-r, 30-c, 31-r, 33-r, 34-o, 35-r, 36-r, 39-r, 55-o, 79-c, 79A-o.

---

*Staurastrum cyrtocerum* Bréb. morpha
Plate XVIII, figs. 19, 20

Cells 25-32 $\mu$ × 27-35 $\mu$, isthmus 7-8 $\mu$. Similar to the preceding form but with a circle of granules above the isthmus. Plants like these were seen by the author in material from Devon Island.

**Habitat**
In squeezings from moss at edge of tarns and permanent ponds. July, August.

**Stations**
12-rr, 13-o, 33-rr, 34-r, 36-r.

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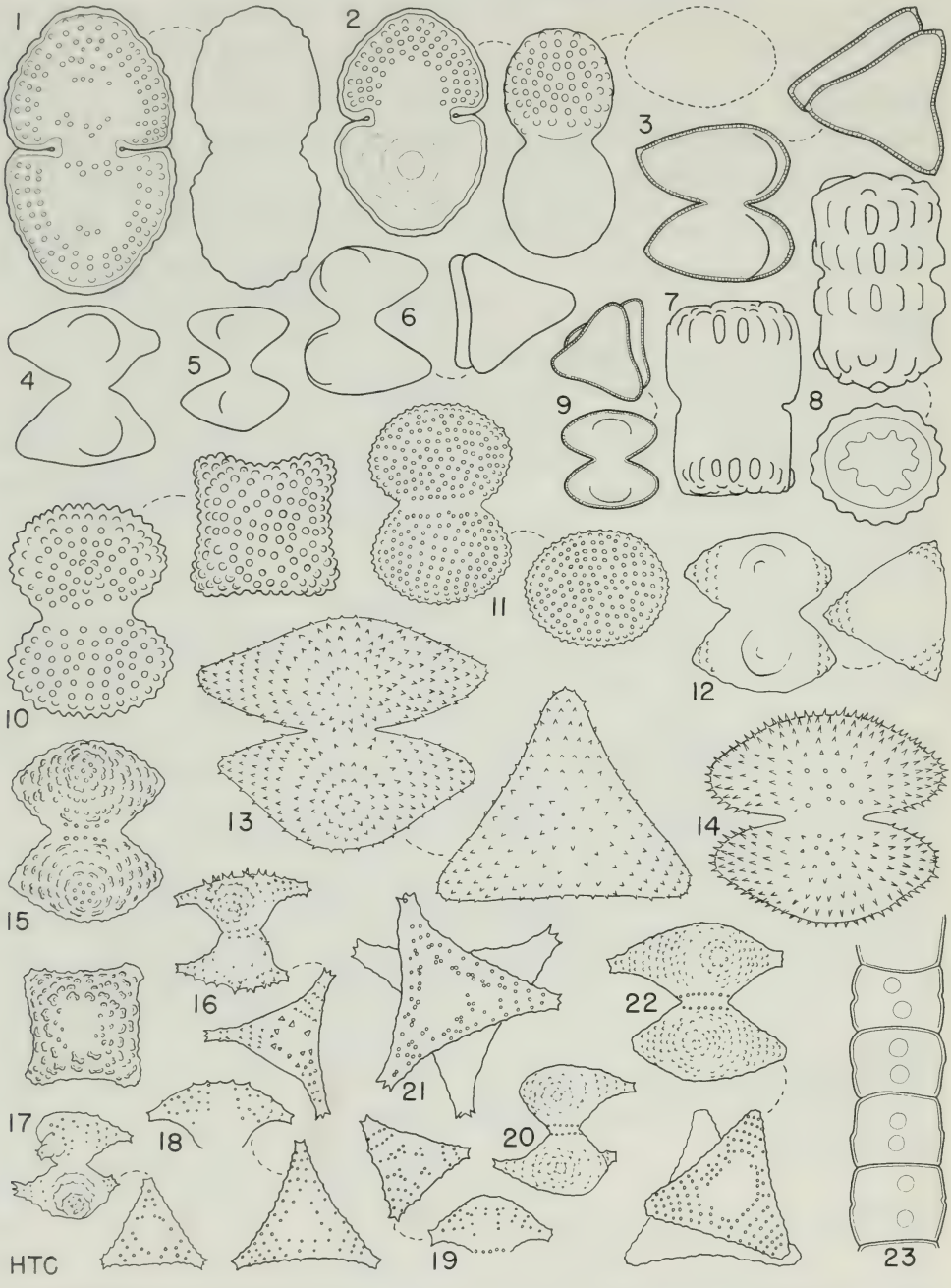
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*Staurastrum muticum* Bréb.
Plate XVIII, fig. 9

Cells 22-27 $\mu$ × 20-27 $\mu$, isthmus 5-8 $\mu$, wall smooth or punctate. Semicells elliptic with rounded angles, sinus acute and open; in apical view with concave sides and rounded angles.

**Habitat**
In squeezings from mosses at edge of tarns. July, August.

**Stations**
34-cc, 35-c, 36-c.

---

*Staurastrum oxyacanthum* Arch. var. *sibericum* Boldt 1885: 119, pl. VI, fig. 40
Plate XVIII, fig. 16

Cells 30 $\mu$ × 34-36 $\mu$, isthmus c. 10 $\mu$. Cells superficially resembling *S. cyrtocerum* Bréb., which is very common in this material, but differing in having the processes longer, more sharply delimited from the body and in the presence of apical spines. The Ellesmere plants resemble a form of Borge (1906: 48, pl. III, fig. 40) in having these spines intramarginal.

**Habitat**
In squeezings from moss at edge of tarn and permanent pond. July, August.

**Stations**
13-o, 34-r, B-r.

---

**Plate XVIII (all ×555)**

**Figure**

1,2
*COSMARIUM SUBEDUCTUM* Gutw. var. **OLIVERI** var. n.,107

3
*STAURODESMUS SPETSBERGENSIS* (Nordst.) Teil. f. *EVOLUTA* Teil., 111

4
*STAURODESMUS PACHYRHYNCHUS* (Nordst.) Teil. var. *PACHYRHYNCHUS*, 111

5,6
*STAURODESMUS PACHYRHYNCHUS* (Nordst.) Teil. var. *PSEUDOPACHYRHYNCHUS* (Wolle) Teil., 111

7,8
*STAURASTRUM RHABDOPHORUM* Nordst. (after Whelden 1947), 116

9
*STAURASTRUM MUTICUM* Bréb., 115

10
*STAURASTRUM PUNCTULATUM* Bréb. var. *KJELLMANI* Wille morpha 1, 116

11
*STAURASTRUM PUNCTULATUM* Bréb. var. *KJELLMANI* Wille morpha 2, 116

12
*STAURASTRUM VARIANS* Racib., 117

13,14
*STAURASTRUM BREBISSONII* Arch., 113

15
*STAURASTRUM SCABRUM* Bréb. f. **BOLDTII** f. n., 116

16
*STAURASTRUM OXYACANTHUM* Arch. var. *SIBERICUM* Boldt, 115

17,18
*STAURASTRUM CYRTOCERUM* Bréb., 113

19,20
*STAURASTRUM CYRTOCERUM* Bréb. morpha, 113

21
*STAURASTRUM BORGEANUM* Schmidle, 112

22
*STAURASTRUM BORGEANUM* Schmidle morpha, 113

23
*HYALOTHECA DISSILIENS* (J.E. Smith) Bréb., 117

*Staurastrum punctulatum* Bréb. var. *kjellmani* Wille morpha 1
Plate XVIII, fig. 10

Cells 45-50 $\mu$ × 35-40 $\mu$ (1.25-1.4×), isthmus c. 20 $\mu$, wall evenly granulate with very large granules. Semicells subrhomboid-elliptic, with wide-open sinus, in vertical view 4-angled. Kossinskaia (1933: 44, pl. IV, fig. 5) and Förster (1965*a*; 157, pl. 8, fig. 22), and two of the author's collections, all from the Arctic, show similar large-granulate forms.

**Habitat**
In squeezings from moss at edge of permanent ponds and a tarn. July.

**Stations**
30-r, 39-r, 55-r, 79-r.

---

*Staurastrum punctulatum* Bréb. var. *kjellmani* Wille morpha 2
Plate XVIII, fig. 11

Cells 50-52 $\mu$ × 30-36 $\mu$ (1.43-1.44×), isthmus 20-21 $\mu$, thickness 27-29 $\mu$. Cells in outline similar to the variety in face view but differing in vertical view, which is broadly elliptic; granules small and irregularly arranged except for a supra-isthmial row; chloroplast not seen. Six cells were seen, all 2-radiate; 4-radiate specimens were found only in the large-granulate form. Although superficially this resembles a *Cosmarium* it seems to come closer to *Staurastrum* in its general appearance in face view, particularly the sharp-angled, wide-open sinus, and in the irregular granulation. Compare *Cosmarium trachydermum* West and West var. *ellipticum* West and West 1907: 206, pl. XV, fig. 18, which, however, has a narrower sinus and more compressed cells.

**Habitat**
In squeezings from moss at edge of permanent pond. July.

**Station**
21A-o.

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*Staurastrum rhabdophorum* Nordst.
Plate XVIII, figs. 7, 8

Cells 47.5-50 $\mu$ × 31.5-35 $\mu$, isthmus 25-26 $\mu$. Semicells subquadrate, with 2 (more rarely 1) rows of elongate verrucae across the face and a marginal row of verrucae on the truncate apex. All verrucae are more rounded than shown in the type.

**Habitat**
"In abundance in a tangle of sterile *Zygnema*". September.

**Station**
E-cc ("On an island in a glacier at Craig Harbour", reported by Whelden 1947: 110, pl. VII, fig. 1).

---

*Staurastrum scabrum* Bréb. f. **boldtii** f.n.
Plate XVIII, fig. 15

*Cellulae 41-42 $\mu$ long., 35-37 $\mu$ lat., 13-14 $\mu$ lat. isth. Cellulae magnae, perornatae, 4-radiatae; quasi omnia granula bina ternaque coalescentia fere super faciem marginemque. Specimen typicum in lacu Skeleton Lake num. 34 dicto, d. 20, m. Jun., 1962, a D.R. Oliver lectum.*

**Holotype**
On microscope slide No. 64-6b, isotype presumably in vial No. 62-6, both deposited in the National Museum of Natural Sciences, Ottawa.

Cells large, 4-radiate; nearly all granules united in two and threes over

most of the face and margin. This large, highly ornamented, 4-radiate form most closely resembles that described from Greenland by Boldt (1888: 39, pl. II, fig. 50).

**Habitat**
With other algae in a tarn. June.
**Station**
34-r.

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*Staurastrum varians* Raciborski 1885: 86, pl. 12, fig. 1 (including var. *badense* Schmidle 1894: 554, pl. 28, fig. 16, see Messikommer 1957: 560)
Plate XVIII, fig. 12

Cells 36-38 $\mu$ × 33-36 $\mu$, isthmus 15-17 (21) $\mu$. Semicells ellipsoid with lateral angles usually ending in a point or knob, sinus open and sharp; granules in circles around the angles, middle area of semicell smooth; sides of semicells in vertical view straight or slightly convex.

**Habitat**
In squeezings from moss at edge, bottom and shore of tarns and large ponds. July, August.

**Stations**
12-rr, 36-c, 39-r, 42-r, 79-o.

---

## *HYALOTHECA* Ehrenberg 1840

*Hyalotheca dissiliens* (J. E. Smith) Bréb.
Plate XVIII, fig. 23

Cells 15-20 $\mu$ × 25 $\mu$, isthmus 22-23 $\mu$. Only one filament seen.

**Habitat**
In open water of a tarn. July.

**Station**
36-rr.

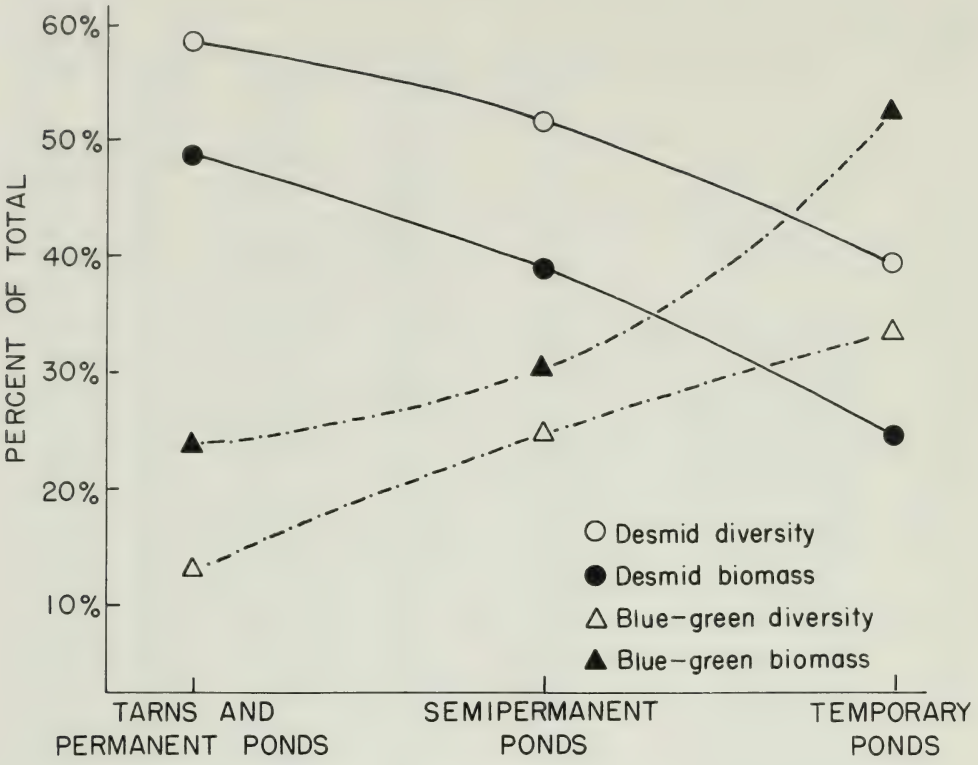
---

## Appendix A

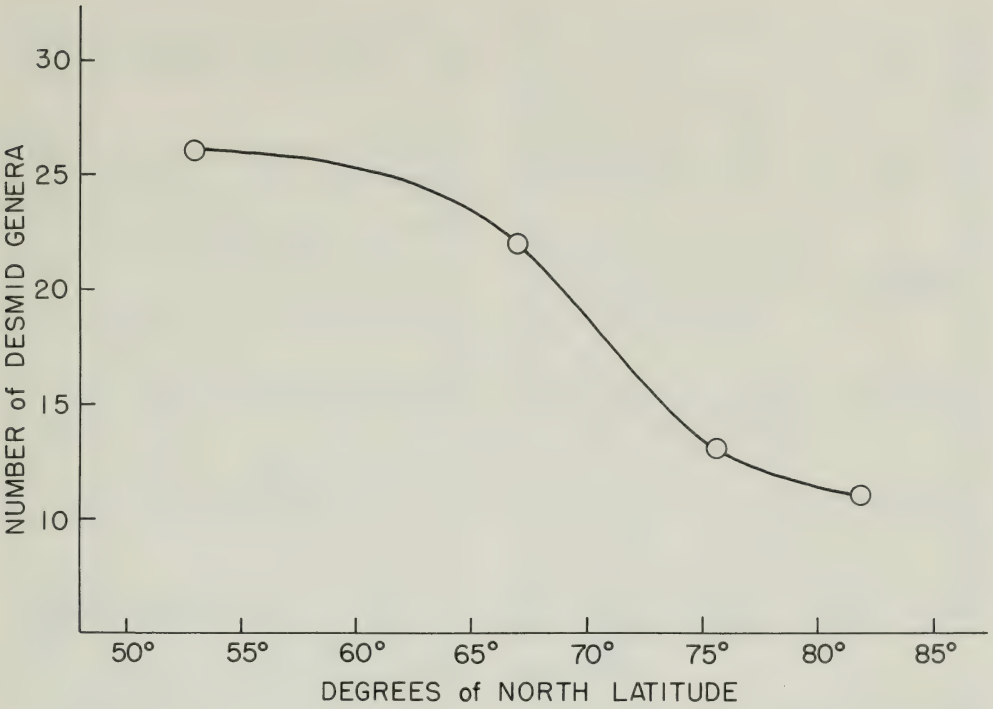
**Table 1**: Stations on Ellesmere Island from which collections were made (Data from Oliver and Corbet 1966)*

| No. | Type of Habitat | Location on Map 2 | Elevation in Metres | Max. Size in Metres | Max. Depth in cm | pH |
|---|---|---|---|---|---|---|
| 1 | Permanent pond | P 11 | 160 | 61 x 39 | c. 68 | 7.2-8.3 |
| 2 | Temporary pond | N 11 | 160 | c. 30 x 15 | 54 | 7.5-8.2 |
| 3-5 | Permanent ponds | N 12 | 158 | 160 x 56 | 48 | 7.2-8.7 |
| 6 | Temporary pond | P 11 | 158 | 110 x 40 | 34 | 7.4-8.7 |
| 9 | Temporary pond | P 11 | 160 | 23 x 38 | 35 | 6.8-8.1 |
| 10 | Tarn | NP 6 | 235 | 280 x 100 | c. 300 | 7.6-8.7 |
| 10A | Stream from 10 | N 7 | | | | |
| 11 | Semipermanent pond | M 10 | c. 183 | c. 76 x 20 | c. 34 | 6.9-8.1 |
| 12 | Tarn | L 2 | 415 | 140 x 70 | c. 206 | 7.3-8.3 |
| 13 | Permanent pond | L 3 | 404 | 60 x 30 | c. 98 | 7.5-8.4 |
| 17 | Permanent pond | A 16 | 189 | 120 x 22 | c. 50 | 7.1-8.9 |
| 18 | Permanent pond | B 15 | 191 | c. 50 x 20 | c. 89 | 7.5-8.6 |
| 19 | Permanent pond | Q 7-8 | 175 | c. 100 x 58 | c. 59 | 7.9-8.1 |
| 21A | Permanent pond | Q 5 | 242 | 18 x 12 | c. 43 | 7.5-7.9 |
| 21B | Permanent pond | Q 5 | 242 | 30 x 22 | c. 47 | 7.7-8.0 |
| 21C | Permanent pond | Q 5 | 242 | c. 13 x 5 | c. 48 | 7.8-8.1 |
| 25 | Temporary pond | R 6 | 189 | c. 58 x 20 | 42 | 7.5-8.5 |
| 26 | Temporary pond | R 7 | 181 | c. 53 x 43 | 36 | 8.2-8.5 |
| 27 | Temporary pond | T 6 | 189 | c. 30 x 13 | 26 | 7.5-8.5 |
| 28 | Permanent pond | T 6 | 181 | c. 30 x 25 | c. 63 | 7.8-8.4 |
| 30 | Tarn | MN 1-2 | 390 | c. 123 x 50 | c. 213 | 7.2-8.5 |
| 31 | Permanent pond | M 2 | 390 | c. 66 x 27 | c. 61 | 7.7-8.2 |
| 32 | Semipermanent pond | G 9-10 | 334 | c. 40 x 20 | c. 93 | 7.9-9.5 |
| 32A | Temporary pond | G 10 | | | | |
| 33 | Permanent pond | D 9 | 311 | c. 41 x 33 | c. 37 | 7.5-8.2 |
| 34 | Tarn (Skeleton L.) | F 9 | 296 | c. 180 x 180 | 425 | 7.4-8.4 |
| 35 | Tarn | F 9 | 296 | c. 100 x 43 | 240 | 7.6-8.2 |
| 35A | Seepage area | F 9 | | | | |
| 36 | Tarn | G 8 | 296 | c. 47 x 40 | 280 | 7.2-8.0 |
| 37 | Temporary pond | P 11 | 160 | c. 30 x 16 | 36 | 7.3-7.9 |
| 38 | Permanent pond | P 11 | 160 | c. 20 x 20 | c. 40 | 7.3-8.1 |
| 39 | Permanent pond | K 3 | 404 | c. 41 x 23 | 72 | 7.6-8.4 |
| 42 | Semipermanent pond | E 10 | 296 | c. 41 x 20 | c. 34 | 7.4-8.1 |
| 43 | Temporary pond | E 10 | 296 | c. 77 x 30 | 18 | 7.1-8.1 |
| 49 | Stream (Blister Creek) | C 12+ | | | | |
| 49A | Wet areas near 49 | | | | | |
| 50 | Stream (Skeleton Creek) | K 8+ | | | | |
| 50A | Wet areas near 50 | | | | | |
| 51 | Stream | R 4+ | | | | |
| 54 | Temporary pond | R 5 | c. 242 | c. 5 x 3 | c. 60 | |
| 55 | Permanent pond | R 5 | c. 242 | c. 10 x 3 | c. 107 | |
| 67 | Temporary pond | M 11 | c. 171 | c. 11 x 6 | c. 91 | 8.1 |
| 71 | Semipermanent pond | Q 5 | 242 | 20 x 2 | c. 76 | |
| 76 | Semipermanent pond | K 3 | c. 415 | | c. 37 | |
| 77 | Semipermanent pond | T 5 | c. 198 | c. 9 x 6 | c. 56 | |
| 78 | Permanent pond | C 9 | c. 326 | c. 200 x 40 | c. 50 | 8.3 |
| 79 | Permanent pond | C 8 | c. 366 | | | |
| 79A | Small pond | C 8 | | | | |
| 80 | Temporary pond | J 4 | c. 404 | | | |
| 83 | Temporary pond | P 11 | 160 | | | |

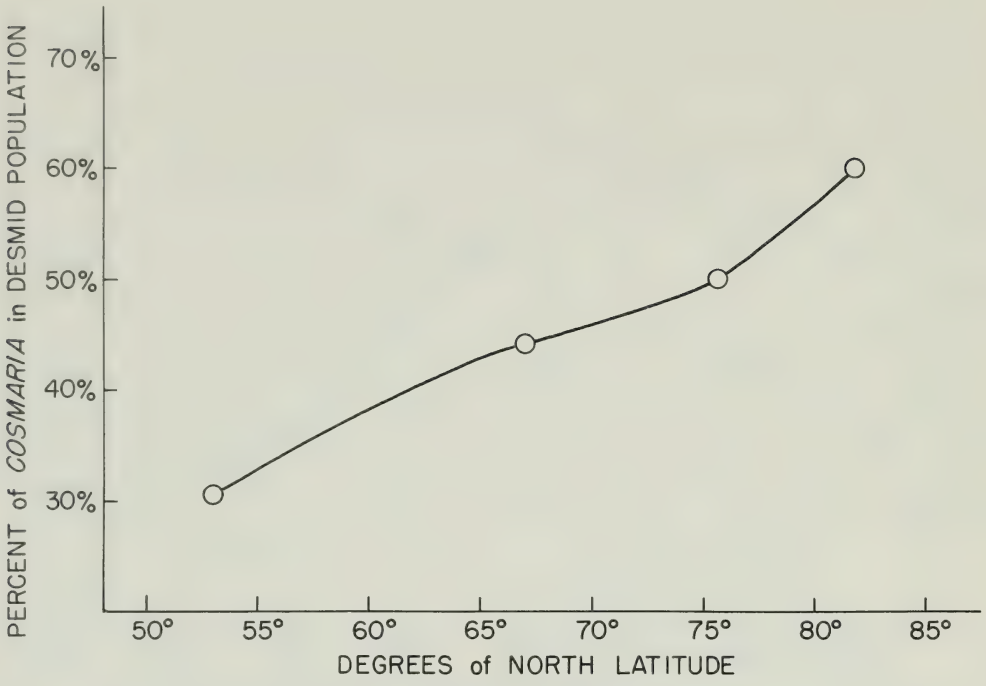
*The stations located by letters are not included in this table, and not all of them are marked on the map. Station B refers to Camp Hazen and Station E to Craig Harbour. Station D, which is marked on the map, is a "stream on a mountain slope", and Station D, which is not specifically located, is "a mountain slope". Station F is not located




Graph 1. Relationship between permanence of a pond and the algae it supports.




Graph 2. Relationship between degrees of north latitude and number of desmid genera.




Graph 3. Relationship between degrees of north latitude and abundance of *Cosmaria* in desmid population.

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